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Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

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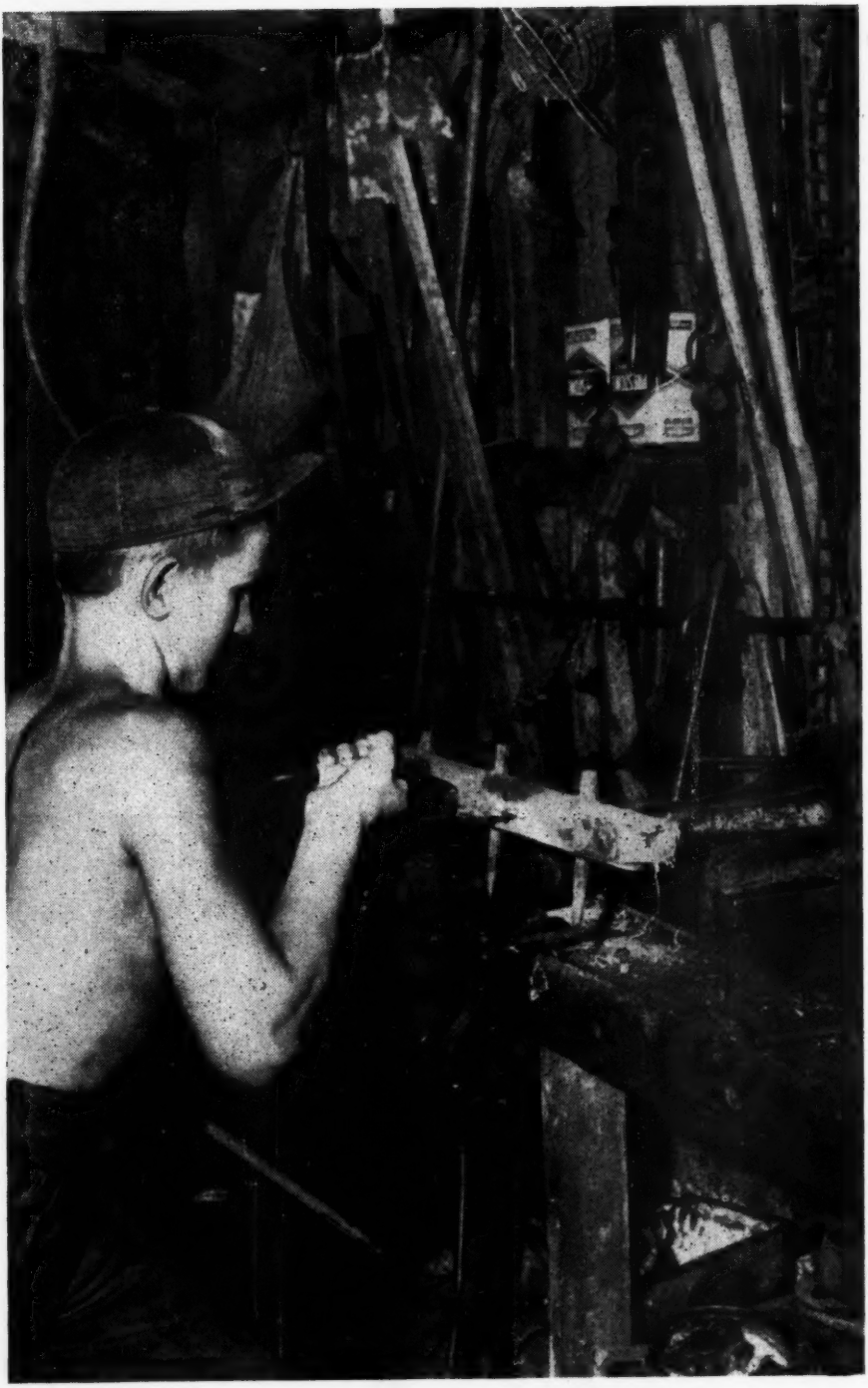

A good workshop with the "know-how" is important to any farm

Better Crops with PLANT FOOD

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VOL. XXX WASHINGTON, D. C., JUNE–JULY, 1946 No. 6

In Defense of . . . . .

Land Lore

Jeff McDermid

AS a fence-jumping rural scribe I often marveled and envied the ease and stark simplicity with which some stump speakers tackled the whole complex farm problem, and had it sorted, screened, steamed, and processed for quick consumption inside of half an hour's discourse. Being so long rather close to the wrinkles on the face of nature and the patches on the jeans of farmers had undermined my confidence in my own ability to lift up their hearts and strengthen their hands solely through the medium of platform platitudes. I have lurked modestly in discreet corners of town halls and other rural forums on many a heated occasion and observed clowns thresh out things that wiser men avoided.

Luckily for the county agent and the other program sponsors, there was always a convenient and ready flow of such wit and wisdom on tap, becoming available and particularly cheap for the committee along about election time. In a sort of belated testimonial to the multitude of miscellaneous misinformation uncorked by such volunteer agricultural clairvoyants, I dip a bit into some of the land lore which many of them abused and misjudged while jumping at conclusions and aiming at much applause. At least it provides me with a bow from which to let fly a few arrows.

Incidentally, it must be frankly admitted at the outset that us solemn

and serious guys deserved to be relegated to the listening posts, regardless of our criticism of the aforesaid vociferous volunteers. We lacked the talent for wise-cracking without which it was supposed no farm audience could be kept awake for twenty minutes after their nose-bags had been removed. Anecdote and repartee have saved many a farce from failure.

Lambasting the middleman as an arch market malefactor was the top-notch theme of most spellbinders back in the days of the first pioneer co-ops. I do not come here myself to defend all the snide games that "happened in the dark" between the God-fearing producer and the humble consumer; but because those preachments of former times were only half truths, they seemed to me unworthy of such undue emphasis. It would have been far kinder and wiser for the speakers to lay it on the line about the increasingly necessary services which the public would demand, and which merchandising co-ops must eventually supply or else go bankrupt.

IN those same categories were those who aimed at the bull's eye of prejudice through blanket ridicule and condemnation of all products which for the moment offered competition to raw farm materials—the synthetics as well as the substitutes, like margarine. "Dirty old axle grease" in reference to a product high in sanitary excellence, accompanied by certain unchecked homeopathic experiments, in which hogs and chickens ate one fat product avidly and nobly refused the other, was not conducive to a vigorous improvement program for creameries.

Another bungling term often heard in debates and orations is the "family-sized" farm. Because so much depends on the ability of any sized family, as well as its equipment and the productivity of its land, a more sensible term to use is either "family-type" or "family-operated" farm. It all adds up the same way, as long as the object sought is to preserve such farms to stand the stress and strain and make the decisions in a changing world not yet ready to accept large-scale corporation agriculture.

To stand up and yodel about the sacred nature of "family-sized" farms or lump them together in regard to protective laws and current regulations is just like flying in the face of facts without a pilot. I have been checking through some heavy ammunition lately which most fervid orators would discard as too tedious and too factual for safe usage.

Studies of family-operated farms were made in five typical zones of this country. In the cotton belt the 1930-45 average net annual farm income was about $1,150 on $7,500 invested capital, of which $3,500 was free of debt. The other four types showed up thus: Dairy farms, $1,600 net annual income on $12,000 invested capital, with $8,000 debt-free; corn belt farms, $1,800 net income on $20,250 capital, with $9,000 of it debt-free; winter wheat farms, $2,300 net income on $20,500 investment, of which $8,000 was debt-free.

The value of machinery and equipment ranged from about $500 on the cotton farm to about $2,000 on the winter wheat ranch. The value of the production per hour of man labor varied from 52 cents on the cotton farm which was family-operated to about one dollar on the same kind of a winter wheat farm. I presume the net degree of satisfaction and family enjoyment as between these types of agriculture is something that no man can weigh or measure by any financial scales or yardstick. I am sure glad to know this is so, because if it wasn't, comparisons would be far more odious than they often are.

LEADING out of that one is its twin question, often asked by legislators and business salesmen who seek a quick estimate of the buying power of agriculture — How much of the gross farm income represents net, or in-the-pocket spending money? The usual replies I have heard on the circuit are

vague and varied, as they might well be. One common rule-of-thumb way is to assume that a certain gross income bears the same relation to net income on all types of specialized farms.

Of course it's silly, but there are folks who claim that the New England dairyman's net income is the same percentage of gross income as either that of the cotton or the wheat farmer, which is worse than misleading doc-

trine. Not only does the relationship between gross and net differ widely as to kinds of activity followed, but it also alters with the passing years. First, one must know what kind of farm—cash grain, hog-beef, hog-dairy, dairy-cash crop, wheat-livestock, southern plains, black prairie or delta—and second, at what level of farm prices and expenses is the income derived.

Maybe we fall so easily into lump sum generalities because our urban business judgment is still hitched to the old walking-plow era of live-at-home, non-commercial agriculture. A farm was just a cozy homestead, then, with maintenance and production costs closely on a par everywhere. What a man ate from his own acreage counted more in net profits than it is ever booked up for now, and cash in hand meant much less in proportion to happiness and contentment.

There has also been a vivid change in the way city folks in the ranks of commerce, labor, and industry keep a watchful eye on farm market opportunities. "Way back when" farmers were not looking so hard for the net dollar, few business organizations ever charted the volume of their sales to rural customers, except to note the purely local effect.

On this great shift of sales and buying emphasis hinges all the equalizing plans and most of the price and parity problems of these complex times. Farmers are never alone in their bookkeeping duties. The business world looks over their shoulders and wafts hopeful breath on the back of their sunburnt necks.

An example of "the why" — In 1932 our farmers spent 328 million dollars for machinery, automobiles, and building materials; but in 1942 they bought two billions' worth, or six times as much of these durable goods out of a cash income only two and a half times greater. Your average farmer is strictly up-to-date and eager to partake of the flesh-pots and helpful gadgets. If the strikers and the strike-resisters ever get this fact into their noodles, maybe we'll begin to sell the farm market as nobody has ever "been sold" before.

As an opposite thought, of course, all must be aware by now of the reliance of farmers for their prosperity upon the non-agricultural earning power and employment level. That, too, has changed, because not over four decades ago the ruralite could "hole in" with his ground-hog neighbor and live off his own fat regardless. One would think that this interdependence among us would tend to curb the too reckless independence of pressure groups, but it seldom seems to do so. When railroaders refuse to haul the food, they, too, go hungry; and when farmers quit growing stuff they will miss some of the tasty variety foods needed to "balance their rations." If railroaders are ready to live off their own backyard gardens or wheat growers and dairymen are willing to forego their citrus fruits, and vice versa, then we can wave the independent banner and

(*Turn to page* 49)

Photograph of a vigorous, healthy, and adequately manured stand of rubber. Note the dense and dark foliage which cuts off nearly all light from the ground. The area supports a luxurious ground cover which checks soil erosion, discourages injurious weed growth, and possibly adds some nitrogen to the soil.

Improved Production on Rubber Plantations

By W. E. Cake

United States Rubber Company, New York, New York

THE natural rubber industry, comprising more than 8,000,000 planted acres, must be regarded as one of the major agricultural projects of the twentieth century.

Rubber-growing is amenable to both small-scale and large-scale operation. On the one hand, there are the many native gardens containing a few trees only; at the other extreme, there are the European and American-owned estates consisting of many thousands of acres in consolidated blocks.

The largest rubber plantations under single ownership are those of the United States Rubber Company, which, before the war, included 28,770 planted acres in British Malaya and 72,871 planted acres in Dutch Sumatra. The total of 101,641 acres was planted with approximately 10,000,000 rubber trees producing at the rate of about 75,000,000 lbs. of rubber per year.

The plantations of the United States Rubber Company pioneered in scientific research as applied to raw rubber production, and many economically important developments have resulted from this work. It is one aspect of this research which is described in the present paper.

Natural rubber production is an industry which requires an abundance of labor. Since each tree has its own

distinct and individual characteristics, it has so far been impossible to develop any satisfactory mechanical means to accomplish the tapping operation. Tapping is therefore a manual process, and a well-run estate requires labor to the extent of about 235 men per 1,000 acres in bearing. The importance of labor in plantation rubber production is illustrated by the fact that tapping costs comprise more than 27% of the total f.o.b. expenses in the preparation of smoked sheets for shipment from Malayan ports. As high as it is, this figure is probably lower than usual for the industry in general since it is taken from the 1942 forecast of operations for the Malayan plantations of the United States Rubber Company, where production was at a considerably higher rate than average for plantations in the East.

It is no more difficult and requires no more time to tap a high-yielding tree than a poor-yielding one. Accordingly, an obvious means of reducing the cost of rubber production would consist of increasing the yield of rubber per tree.

Developments toward increasing the yield per tree have been accomplished along two different lines; namely, (1) the application of fertilizer treatment in stands planted to rubber, and (2) improvement of the stock available for planting through genetical selection.

The United States Rubber Company's first sizable plantings were conducted in 1911 in the Asahan district of the East Coast of Sumatra. Two different soil types are encountered in this area: (1) A white loam, frequently containing sand and/or clay, extending along the coast; and (2) a red soil of volcanic origin formed in situ from liparite tuff which occupies the higher ground farther away from the coast.

The rubber was planted at the rate of 121 trees per acre. Tree losses and thinning reduced the density somewhat; accordingly, the stands averaged about 100 trees per acre at the time production started. For most considerations, it is sufficiently accurate to regard the yield per acre as 100 times the average yield per tree in an area of rubber.

The original planting was conducted with ordinary unselected seedlings of the type available in the East at that time.

These early plantings were brought into regular production in the latter part of 1915 and the first complete year's records were therefore obtained in 1916. The early yields were low, particularly in the white soil areas where, even during the third year of tapping, 1918, the harvest amounted to only about 250 lbs. dry rubber per acre. Yields in this range are insufficient to allow adequate returns on investment at the market prices for rubber which have, in general, prevailed.

Manuring Treatment

The question arose as to whether the situation could be improved through the use of artificial fertilizers. There was already plenty of evidence to the effect that growth, foliage, and fruit production can frequently be improved through fertilizer treatment. However, it did not immediately follow that manuring would increase the rate of rubber production since the rubber-containing latex of *Hevea brasiliensis* is neither foliage nor fruit; furthermore, nothing was known of the function of latex in the physiology of the tree nor of its precursors. There perhaps was some logic to the supposition that, if manuring improved growth, the larger trees resulting therefrom might give higher yields.

During the year 1919, the first comprehensive manuring experiment with rubber was laid out in a white soil area of the 1911 plantings. Various quantities, intervals of application, and kinds of artificial fertilizers were tried; all of the manures contained nitrogen. It is sufficient for the present to describe two of the treatment series: Series C involved annual applications of sodium nitrate at the rate of 5 lbs. per

tree; Series E involved biennial applications of ammonium sulphate at the rate of 4 lbs. per tree. (Five lbs. sodium nitrate contain approximately the same amount of nitrogen as 4 lbs. ammonium sulphate.) Series A comprised an unmanured control.

The yield response to these fertilizer treatments was rapid and decided. At the same time, there was a marked improvement in the appearance of the manured trees in that the foliage became denser and darker green in color. Also, the trees in the manured plots showed improved growth rates.

The results of carefully controlled yield measurements in this experiment are shown in Table 1; the same data are presented graphically in the chart which follows the table.

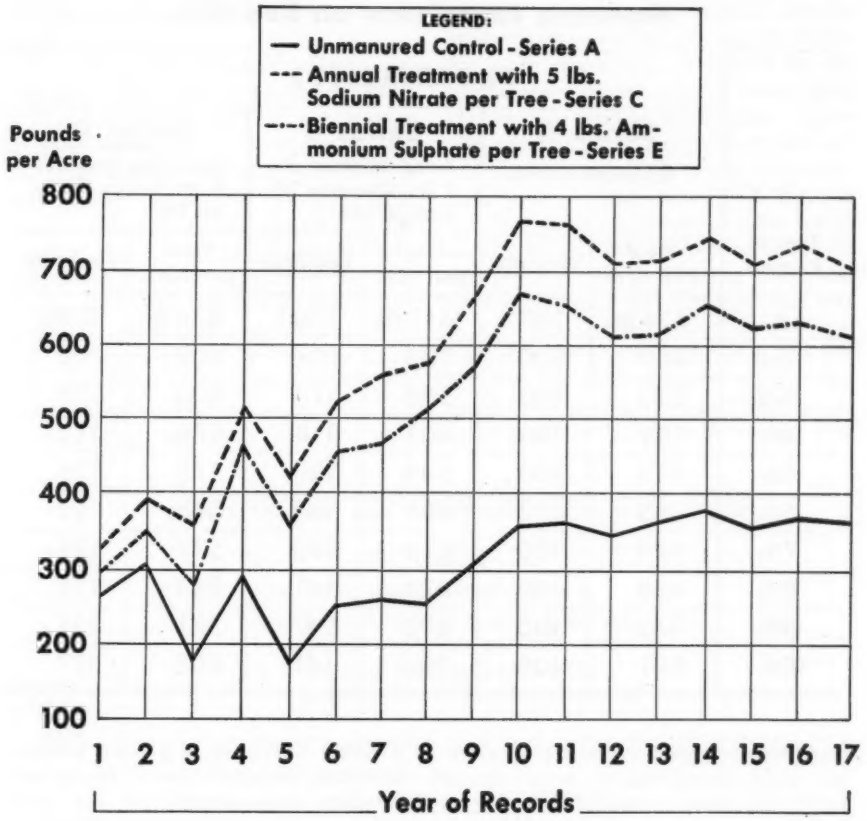
The foregoing data indicate decided yield improvements due to manuring, increasing at first but gradually leveling off to more or less constant values. After becoming constant, annual manuring resulted in a proportionate yield

Table 1

Manuring Experiment on White Soil

Year of Records	TREATMENTS					
	Series A — Unmanured Control		Series C — Annual Treatment with 5 lbs. Sodium Nitrate per Tree		Series E — Biennial Treatment with 4 lbs. Ammonium Sulphate per Tree	
	Yield per Acre	Relationship	Yield per Acre	Relationship	Yield per Acre	Relationship
1st	279 lbs.	100%	321 lbs.	115%	292 lbs.	105%
2nd	311	100	393	127	353	114
3rd	180	100	354	196	283	157
4th	298	100	534	179	465	156
5th	171	100	422	246	353	206
6th	255	100	535	210	467	182
7th	268	100	550	205	473	177
8th	259	100	581	225	505	196
9th	307	100	672	219	575	187
10th	362	100	764	211	671	186
11th	358	100	757	211	656	183
12th	334	100	709	213	608	182
13th	363	100	725	200	611	168
14th	380	100	741	195	658	173
15th	356	100	719	202	623	175
16th	372	100	736	198	633	170
17th	357	100	707	198	615	173

MANURING EXPERIMENT ON WHITE SOIL


LEGEND:
— Unmanured Control - Series A
--- Annual Treatment with 5 lbs. Sodium Nitrate per Tree - Series C
-·-·- Biennial Treatment with 4 lbs. Ammonium Sulphate per Tree - Series E
Pounds per Acre
800
700
600
500
400
300
200
100
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
Year of Records

increase of about 100% and an actual yield increase of approximately 370 lbs. rubber per acre per year; the biennial treatment caused a proportionate yield increase of about 75% and an actual yield increase of approximately 270 lbs. rubber per acre per year. The advantage of annual over biennial treatments amounted to about 100 lbs. rubber per acre per year.

In view of these highly satisfactory results on white soil, it was decided to conduct a somewhat similar manuring experiment with rubber situated in a red soil area of the property. In such stands, the early yields were not so low as in the white soil areas and growth was somewhat better; however, it seemed important to determine the manner in which red soil stands of rubber would respond to treatment with nitrogenous fertilizers.

It is perhaps sufficient to describe two of the treatment series in this manuring experiment on red soil. Series B involved annual applications of ammonium sulphate at the rate of 4 lbs. per tree; Series D involved biennial applications of sodium nitrate at a rate of 5 lbs. per tree. In this experiment also, Series A comprised an unmanured control.

Results of the yield measurements in this experiment are shown in Table 2; the same data are presented graphically in the chart which follows the table.

Upon comparison with the white soil experiment, the response to fertilizer treatment in this red soil area was

Table 2

Manuring Experiment on Red Soil

Year of Records	TREATMENTS					
	Series A — Unmanured Control		Series B — Annual Treatment with 4 lbs. Ammonium Sulphate per Tree		Series D — Biennial Treatment with 5 lbs. Sodium Nitrate per Tree	
	Yield per Acre	Relationship	Yield per Acre	Relationship	Yield per Acre	Relationship
1st	414 lbs.	100%	412 lbs.	100%	426 lbs.	103%
2nd	469	100	503	107	509	109
3rd	523	100	598	114	606	116
4th	509	100	601	118	575	113
5th	443	100	534	120	515	116
6th	465	100	621	133	565	121
7th	474	100	618	130	577	122
8th	478	100	674	141	564	118
9th	472	100	693	147	571	121
10th	501	100	704	141	586	117

somewhat sluggish and the proportionate yield improvements were not so large; the latter is undoubtedly due, at least in part, to the fact that the unmanured controls in the red soil experiment have given consistently higher yields than the unmanured fields of the experiment on white soils. Nevertheless, in the red soil experiment also, the improvements in production due to manuring are significant and appreciable. After attaining more or less constant levels, annual manuring resulted in a proportionate yield increase of about 40% and an actual increase of approximately 200 lbs. rubber per acre per year; the biennial treatment caused a proportionate yield increase of about 20% and an actual yield increase of approximately 100 lbs. rubber per acre per year.

As soon as the manuring experiment on white soil began to show definite indications of yield improvement through fertilizer treatment, a general program involving the application of nitrogenous manures was adopted for the white soil areas of the property. The same was done for the red soil stands when the experiment on this soil type started to yield positive results. Approximately 10,000 acres were accorded manuring treatment in 1921; by 1923, the whole "H.A.P.M." complex of about 40,000 acres was included in the program.

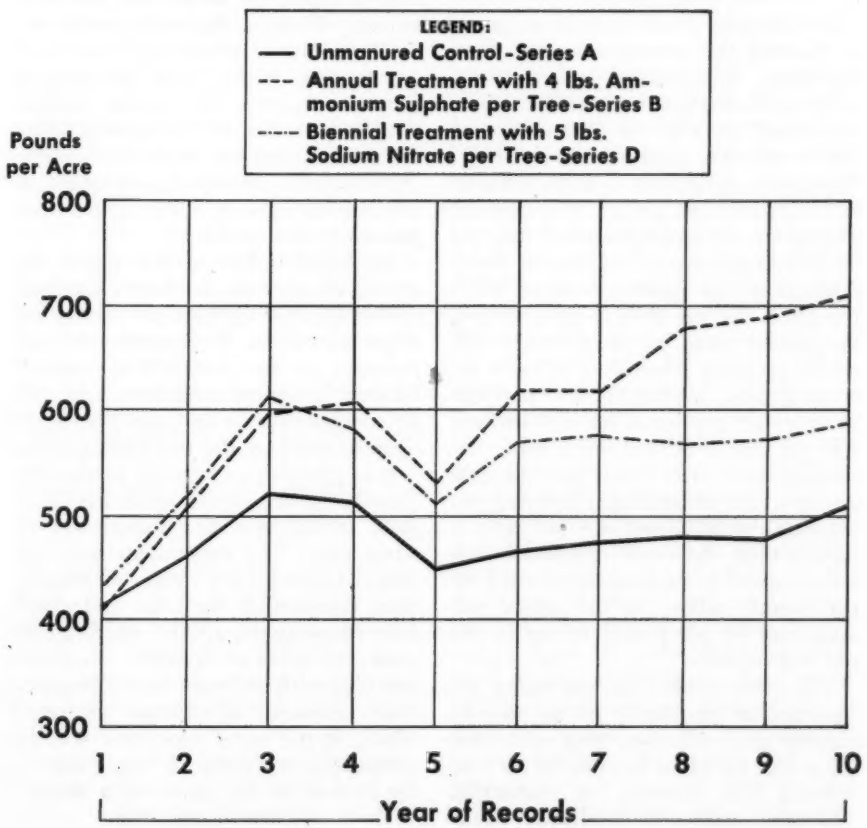
Due to variable economic factors, the periodicity of fertilizer application has not been held constant. In general, the whole property was accorded treatment during years of high rubber prices and about half the area during years of low market price. No stand was omitted from manuring for more than one year and, so far as possible, the poorer areas were given preference in frequency of treatment. As an average from 1923 up until the war with

Japan, the periodicity of application was about equivalent to a point halfway between annual and biennial treatment.

Following the adoption of this manuring policy, the plantations as a whole showed successive improvements in yield during the ensuing years. By 1932, the whole of the 40,000 acres comprising the "H.A.P.M." complex produced rubber at an average rate of 684 lbs. per acre. Yield improvements continued beyond this date but, by this time, appreciable areas planted to genetically improved stock had come into bearing and, as separate records were not kept, it is impossible to designate how much of the further improvement was due to manuring and how much to the tapping of selected planting material.

In any event, the over-all average of 684 lbs. rubber per acre in 1932 demonstrated quite conclusively that the benefits from manuring, as shown by the experiments, were indeed being fully realized in general application. Since the annually manured plots in both experiments attained about the same ultimate yield (approximately 700 lbs. per acre per year) and since the unmanured control fields leveled off around 360 lbs. per acre per year in the white soil experiment and 480 lbs. per acre per year in the red soil experiment, it follows that the general average of 684 lbs. per acre in 1932 reflected a yield improvement due to the fertilizer treatment of about 325 lbs. per acre per year

MANURING EXPERIMENT ON RED SOIL



in the white soil areas of the property and around 200 lbs. per acre per year in the red soil stands.

The general manuring was conducted with either ammonium sulphate or sodium nitrate, depending upon which was cheaper to purchase during any particular year. The cost of fertilizer application varied considerably from year to year; it was highest just before the war when, in 1941, the treatment involved an expenditure of $10.73 per acre manured. During "normal" years, the cost of fertilizer treatment was much lower; for example, in 1936 the expenditure amounted to $4.60 per acre treated. These figures are total costs; i.e., they include not only the price of the fertilizer but also freight, insurance, local transport, and labor for application in the field.

Fertilizer Profitable

For the sake of extreme conservatism in showing the economic returns from manuring, consideration is here given only to the highest treatment cost encountered; namely, the expenditure of $10.73 per acre incurred during 1941. Taking the periodicity of application as half way between annual and biennial treatments, the average annual cost, on the 1941 basis, would amount to three-quarters of the figure noted, or $8.05 per acre. As has already been shown, the general manuring program over the whole property resulted in a yield increase of, say, 325 lbs. per acre per year in the white soil areas and 200 lbs. per acre per year in the red soil stands. Assuming these extra yields have become available for an average manuring expenditure of $8.05 per acre per year, it follows that the extra production has been realized at a manuring cost of 2.5¢ per pound rubber in the white soil areas and 4¢ per pound rubber in the red soil stands.

The extra yields from manuring are harvested at practically no increase in tapping and collecting costs and these items can therefore be ignored in considering the economy of manuring. The same applies to overheads. Taking transport and processing costs in smoked sheet manufacture at 1.36¢ per pound and Netherlands Indies export duty at 2.64¢ per pound, it follows that the extra rubber from manuring treatment can be placed f.o.b. Netherlands Indies port at a total extra cost of about 6.5¢ per pound in the case of production from white soil areas and 8¢ per pound with the harvest from red soil stands. Since the market price for smoked sheets f.o.b. Eastern port has ranged between 13 and 20 cents per pound during recent years, the financial advantage resulting from manuring on these rubber plantations becomes immediately apparent. Actually, the early adoption of a manuring program for the Sumatra plantations of the United States Rubber Company was one of the principal factors in transforming what appeared at first as a mediocre venture into an enterprise which was profitable indeed. From a financial standpoint, the feasibility of manuring as a means to increase yields was particularly fortunate because the higher production becomes available almost at once; the other important method of attaining improved production, i.e., genetical selection of planting material, is a comparatively slow process.

As stated earlier in this paper, the use of nitrogenous fertilizers on these rubber plantations resulted in marked improvement in the growth and appearance of the trees. The contrast between a nitrogen-deficient area and an adequately manured stand is clearly demonstrated by the two photographs.

It is probably of interest to mention a further development which has taken place in the manuring experiment on white soil. The experiment was continued beyond the 17 years of observations reported in the table and graph accompanying this article. During later years, the plots of Series C (manured annually with sodium nitrate) began to show marked diminution in yield while, at the same time, this was accompanied by signs of regression in the crowns of the trees and a decided

(*Turn to page* 47)

Dynamic Sassafras Soils

By George R. Cobb

Salisbury, Maryland

IN 1921 J. M. Snyder and R. L. Gillett, representing the USDA Bureau of Soils, made a soil survey of Wicomico County, Maryland. As I was serving as County Agent at that time my interest in soils was naturally increased and because I was planning to purchase some farm land I awaited the results of the survey with a strong personal interest. Incidentally I secured several glass tubes, 3 feet by 2 inches, in which the "surveyors" placed profiles of the different soils in the county. These tubes were used for display in the office and were visual aids in explaining to farmers and would-be farmers the differences between the soil types of the county.

The survey showed that the Sassafras series of soils was perhaps the best soil for all farming purposes and that there were more acres of this type in the county than any other. Among the soils listed in the survey were Keyport, Elkton, Portsmouth, Norfolk, St. Johns, Tidal Marsh, Swamp, and Sassafras. The total acreage of Sassafras in the county consisted of—

	Acres	*or* %
Sassafras sand	24,000	9.9
Sassafras loamy sand	22,400	9.3
Sassafras sandy loam	8,704	....
deep phase	6,784	6.4
Sassafras fine sandy loam	6,904	2.5
	68,792	28.1

In discussing the survey with Messrs. Snyder and Gillett it became clear that the Sassafras sandy loam was the best soil in the county for agricultural purposes because of its good drainage, ease of handling, and natural productiveness. The surface soil of the sandy loam consists of a light-brown, mellow light loam with a depth of from 8 to 10 inches. This is underlain by a reddish-yellow or yellowish-brown heavy sand or sandy clay loam extending to 22 to 30 inches where it passes abruptly into a dull red or reddish yellow sand or loamy sand. The good drainage is due perhaps to position and the presence of the porous substratum. The friable, heavy-textured subsoil, however, is retentive of moisture, and crops do not suffer during ordinary droughts. It can also be tilled under a wide range of moisture conditions.

The Sassafras soils are classed under soils of the Coastal Plain and may be found in New Jersey, Delaware, Maryland, and Virginia. On these soils "there exists a very highly improved type of agriculture and the best yields of wheat, clover, and timothy in the South are made on the Sassafras loam and silt loam." In New Jersey the series covers over a million acres (Hester) and the sandy loam embraces about 150,000 acres and is described as "one of the better agricultural soils of the Coastal Plain." The series includes sandy loams, gravelly loams, loamy sands, and fine sandy loams. These soils contain more organic matter than the gray soils of the Coastal Plain, such as the Norfolk series, and they are more retentive of moisture and naturally more productive.

Coastal Plain soils are said to be of the Pleistocene age and of the Columbia group and made up of un-consolidated gravels, sands, and sandy clays. Most of these soils have been derived mainly from the erosion of the Piedmont Plateau and other inland areas, and the materials were transported and deposited beneath the sea to be exposed by the uplift of the ocean floor. In geological sense the soils may be said to be of recent origin, for it has been

Differences in growth of tomatoes growing in sassafras sandy loam are clearly indicated in the following treatments:

51—no fertilizer
53—fertilizer only
55—lime only
57—fertilizer-lime
59—fertilizer, lime, minor elements

but comparatively lately that they have been exposed.

Some authorities rate the Sassafras series of soils as among the "poor" soils as compared with a Hagerstown loam which is rated as a "good" soil. The following table compiled by F. H. King illustrates the difference, chemically, between "good" and "poor" soils.

Pounds of water-soluble plant food in 4 million pounds of soil

	Average of 4 poor soils	*Average of 4 good soils*
Nitrogen	7.5	21.3
Phosphorus	12.1	22.2
Potassium	46.0	69.3
Magnesium	44.9	91.9
Calcium	100.5	264.8
Sulphur	66.9	156.9

In 1941 a study of soils from successful and unsuccessful tomato fields was made by the University of Delaware to determine, if possible, the most satisfactory soil fertility levels for the economic production of tomatoes in Kent County of that State. Three soil samples were taken from each of 23 farms or fields. These samples were taken from poor as well as good producing soils and chemical tests were made of these samples.

Soil analysis	*Average yield ⅝ bkts. per acre*
pH above 5.8	386
pH below 5.8	440
Mg. medium	438
Mg. low	389
Org. M. above 1%	477
Org. M. below 1%	362
N. high	476
N. medium	378
P. low to medium	392
P. low minus to low	440
K. low plus to medium	457
K. low minus to low	341

Of special interest in the above table is the fact that a low pH produced more tomatoes than did a pH above 5.8 which is contrary to many other experiments. Also it may be noted that a low minus to low phosphorus content produced almost a ton more per acre than did a soil where the phosphorus content was low to medium. Otherwise the results of this survey show that what may be considered a "good" soil will produce more tomatoes than a "poor" soil.

Soils not only differ chemically but they also vary in their mechanical make-up as illustrated by the following table:

	Fine gravel Per Cent	*Coarse sand* Per Cent	*Med. sand* Per Cent	*Fine sand* Per Cent	*V. fine sand* Per Cent	*Silt* Per Cent	*Clay* Per Cent
Sassafras fine sandy loam	0.6	8.0	14.6	27.0	24.1	19.8	5.9
Sassafras loam	2.4	8.1	6.2	13.2	20.1	40.4	9.6

Comparing a Sassafras soil with a Lansdale loam and a Toledo soil we find that:

	Sand	*Silt*	*Clay*
Sassafras contains	65%	26%	9%
Lansdale soil contains	31	51	17
Toledo soil contains	20	52	28

showing that as the soils increase in natural productiveness, the sand and gravel content decreases while silt and clay increase.

The most recent work with a Sassafras sandy loam that has come to my attention is that done by Dr. J. B. Hester in the Campbell Soup Company's laboratories at Riverton, N. J. The results of this work have been published as a monograph entitled "Fundamental Studies on some Tomato Producing Soils" in which are compared 11 different un-cropped soils. As the results of this study agree with results of hundreds of demonstrations conducted by the American Potash Institute on many farms in the northeast and mid-Atlantic section, it seems advisable to review a part of this study.

In this review a Sassafras sandy loam will be compared with a Lansdale loam which is naturally a more productive soil than a Sassafras and a Toledo soil which is more productive than either.

These soils were placed in three gallon pots with 14,000 grams of soil, representing two horizons, and set to tomatoes. Although neither the Lansdale nor the Toledo are found in the Coastal Plain, the Lansdale is found in eastern Pennsylvania, and many acres are devoted to tomato culture, while the Toledo is a popular tomato soil type in Ohio.

The series of pots were treated differently—one series having nothing added as compared with a series having fertilizer (12-24-12) added, another series having lime only applied, a third series had fertilizer and lime applied, and the last series had fertilizer, lime, and minor elements added to the soil.

It has been shown that soils differ mechanically, and the table below illustrates some chemical differences found by Dr. Hester in the three soils mentioned:

	pH	*Ca*	*Mg*	*NH4*	*P*	*K*	*Mn*	*Al*
Sassafras sandy loam	4.8	VP	P	G	VP	P	VVH	VH
Lansdale loam	5.3	F	G	VP	P	P	H	H
Toledo	7.3	VVG	G	F	VG	VG	L	N

This table is self explanatory and shows that a fertile soil contains more of the plant-food elements than does a non-fertile soil, except perhaps manganese and aluminum which may be classed as plant-food elements.

Of interest is the chemical analysis of the Sassafras soil before and after the soil amendments were added:

	pH	*Ca*	*Mg*	*NH4*	*P*	*K*	*Mn*	*Al*
Un-cropped virgin soil	4.8	VP	P	G	VP	P	VVH	VH
Fertilizer added	5.0	VP	F	VVG	F	VG	VVH	T
Lime only added	6.75	VG	G	F	VP	F	M	T
Fert. and lime added	6.45	VG	G	VG	VG	VG	M	N
Fert., lime, and minor elements	6.60	G	G	VVG	VG	VG	VVH	N

It will be noted from this table that a Sassafras sandy loam in its virgin state is extremely acid, the replaceable Ca, Mg, and K low. The organic

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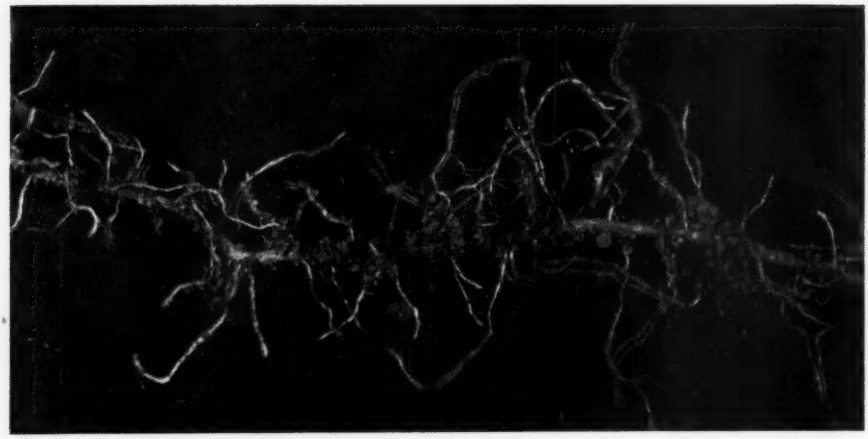


Potato roots with here and there a globular golden nematode attached.

The Newest Potato Pest—Golden Nematode

By Charles E. Gapen

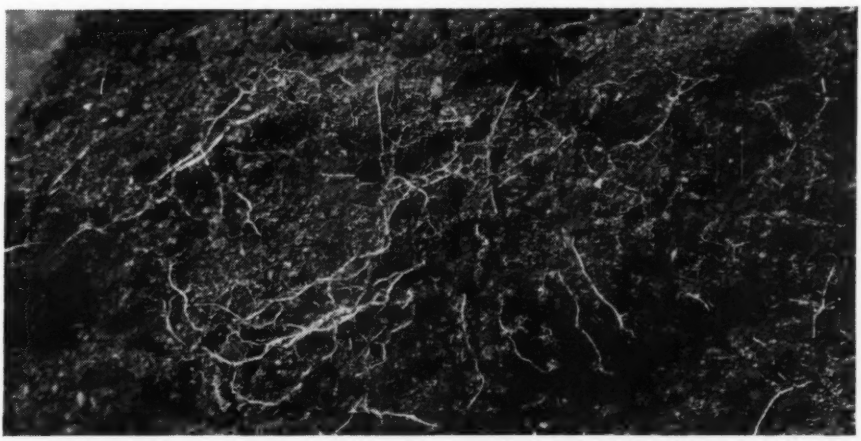
Agricultural Research Administration, U. S. Department of Agriculture, Beltsville, Maryland

THE newest potato pest in America, the golden nematode, gradually comes out in its true colors as Federal and New York State scientists study its oozing spread in Nassau County, Long Island. For generations a drain on the potato growers of Northern Europe and now established on much of the potato land of England and Ireland, it was first found in the United States in a potato field near Hicksville, about 40 miles east of New York City. Since 1934, the farmer-owner of that failing field had been asking for soil tests of several unproductive spots in an effort to locate the cause of his trouble. So it seems to Dr. G. Steiner, head nematologist of the U. S. Department of Agriculture, that, wherever this new crop threat came from, it probably got its start on this continent at least as early as 1930. Its continued presence here for possibly 15 years marks it as a danger to be considered in the future of all American potato areas.

Now the Department, Cornell University, and New York State researchers and inspectors find the golden nematode on approximately 800 acres in the vicinity of the Island potato-belt towns of Hicksville and Bethpage. Dr. Benjamin G. Chitwood, the resident nematologist from the Department's Bureau of Plant Industry, Soils, and Agricultural Engineering, says there are as many as 50 to 75 of the readily visible female nematodes in an ounce of the surface soil. By "surface soil" Dr. Chitwood means down to a depth of 3 or 4 inches. When potatoes are growing in the infested soil these small organisms, called eelworms by the English because of their appearance in one stage, become active when the temperature has reached

59° F. Chitwood digs up handfuls of soil and roots and shows how the females somehow are attached to the fine rootlets. They (the females) hold on and gain their substance from the plant that is all set to produce tubers. When they first begin their active life, that is, after they have hatched from the eggs that were left in the dead body of the mother nematode, they are almost transparent. This is the only stage when they can wiggle and move about; they are then threadlike rather than globular. When they become globular, like many men, they become sedentary. At this stage the laboratory men say they are a "protoplasmic gray" color, a common color of minute cells. Then with the maturing processes these little-more-than-microscopic eelworms become "bubbles" that are visible to the naked eye and gradually change to white, then to ivory, then to the bright golden color which gives them their name, and then to brown. You can see all these colors in a handful—except the protoplasmic gray. Gently free the roots of most of the dirt by letting it sift away between the fingers and many of the nematodes may be seen apparently cupped in slight depressions on the surfaces of the rootlets. As the soil and the rootlets dry, the organisms rub off readily and mix with the soil like bright grains of fine sand.

But when the potato plants push their roots near these hungry nematodes in the soil, the organisms make another tenuous attachment and go ahead with their life work of sucking nourishment and moisture from the crop. They cut the rootlets and interfere with the plant's supply of water and fertilizer, greatly reducing yields. Where infestation is high, the yield of late potatoes may be only one-fourth or less of normal and is unprofitable. (Dr. Chitwood says that if the golden nematode cannot be eradicated or controlled at reasonable cost, the infested lands cannot be used to grow late potatoes.) Early potatoes, such as Cobblers, if planted very early, may yield fairly well as they can do much of their growing in spring when soil temperatures are low. Such varieties can produce a good crop of tubers before the root system has been damaged badly. However, definite conclusions have not as yet been reached as to just what is to be done. Field research men and inspectors have been accumulating facts as a basis for action toward eradication, control, or as a basis on which to get along with this pest without too much of a cut in yield or too much expense. The experiments in the use of the soil fumigrants—DD mixture, Dowfume G., chloropicrin and carbon disulfide—indicate a very considerable control effect which in certain



This photograph of broken soil beside a potato plant shows the stolons and roots of the plant and the nematologists can recognize the female nematodes appearing like small grains of sand.

applications has killed off nearly 100 per cent of the nematode. The expense of applying these chemicals for commercial control, however, is high, and DD mixture, which so far seems best, costs about $60 an acre, says Chitwood. Unless the control effect extends over more than one season, he thinks it might not be commercially feasible.

Other ways out of this nematode pickle that have been suggested include: (1) A change over to other crops since the pest attacks only potatoes; (2) the public purchase of an area containing the infested lands and the disposition of them for other than agricultural uses; and (3) the selection or development of potato varieties that grow early enough to avoid the nematode or that will resist its attack.

DD mixture is a by-product of the petroleum industry that has recently been under test to determine its qualifications as a killer of various nematodes and other soil crop pests. The Division of Nematology, under Dr. Steiner's leadership, has been testing it at the Plant Industry Station at Beltsville, Md., and in field tests of various crops in addition to those tests on potatoes in the Long Island area. It is introduced into the soil to a depth of 4 to 6 inches. This gassing of the soil to get the golden nematode is done in the fall and so far it seems possible to cut down the infestation by 99 per cent at the previously mentioned cost of $60 an acre.

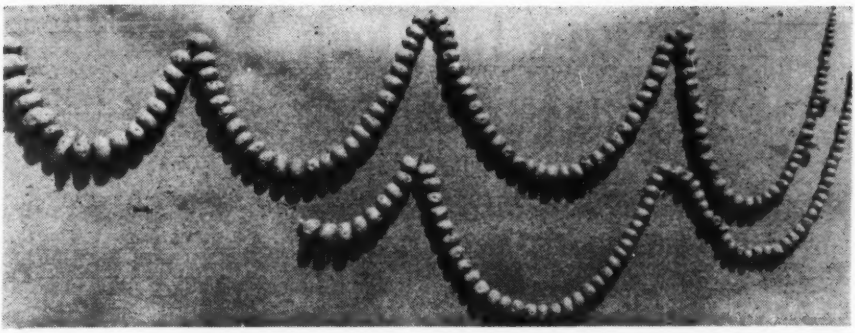
The relative size of the female golden nematodes is indicated as they show up on a dime as background.

As a result of these fall applications, in the spring when "invasion week" comes around—that is when the soil temperature is 59° or more—there are too few nematodes to make much of a dent in the root system of the potatoes. But those nematodes that are left multiply fairly rapidly, and it is not yet known whether the application of DD mixture will have enough lingering effect to make possible a second good crop on the treated ground.

The life cycle of the golden nematode has a strange twist to it; the female, full of eggs, dies and her body provides a protective egg case. The cyst-like body lies in the soil, eggs hatching over a period of several years and larval nematodes coming out to join the teeming vari-colored millions in the soil of the potato field. This way of living, according to Dr. Chitwood, is a strong link the pest has with the future. He says they have not yet found out just how long the golden nematode will maintain its hold in the soil, whether potatoes are grown on the land or not, but according to European experience it is at least eight years if the pest is not interfered with by the fumes of DD mixture or some other nematicide that the future may turn up.

So far the male g.n. has not been mentioned—not that he is nonessential. The male is invisible to the naked human eye and, furthermore, does not occur in such large numbers as the female. Apparently nobody bothers about his color. Perhaps the assumption is that it is protoplasmic gray.

The effect of nematode attack on the appearance of the potato plant is such as to indicate the seriousness of the malady. Even the above-ground parts of the plants in a badly infested spot look sad, as might be expected with all these hangers-on. This is why the Long Island farmer on whose land the golden nematode first appeared had become alarmed about "bad spots" in his fields. It is the reason some farmers



The increase as a result of treatment against the golden nematode is largely in No. 1 potatoes.

have spoken of the golden nematode damage, before they learned the cause, as "lightning spots." They thought that bolts of lightning had hit their fields. Maybe that explanation was correct in some cases as lightning has been known to blast and kill spots of vegetation.

There is now no more confusion in the Long Island area about the common cause of this destruction of the potato crop. The plants are, of course, suffering from a lack of food and water because the pipe-lines have been cut, not by swift lightning, but by a slow organism. The root system itself, when taken up and examined, shows a characteristic development. Instead of vigorous roots and long stolons with widely spaced strong branches on which No. 1 tubers could grow, there is a mat of fine roots, a sort of horsetail or string-mop effect. There may be as many potatoes as on a healthy plant but they will be very small, what the farmer calls "marbles." If a field is heavily infested the tops of the potato plants will go down rather quickly after the soil temperature gets up to the 59° level.

Dr. Chitwood has listed various ways in which the golden nematode may be spread—by man and by nature. Farmers spread the organisms when they move potatoes from infested land to other places, to storage, to other farms, to consumers; when they take implements or work animals from infested field to uninfested fields; when they go themselves from infested to uninfested land; and when they use infested seed or potato bags containing infested soil.

Nature moves these small organisms wholesale—in rain water flowing from infested to uninfested land even where the slope is very slight; and the wind blows the cyst-like female with her charge of eggs, along with other dust, from field to field.

The golden nematode disease is aggravated by economic conditions. For example, in the Long Island area the good potato land is high priced, so farmers do not waste land in hedge rows; too, there are few fences with the accompanying grassy ridges which might otherwise serve to slow up the drift of nematodes by air or water. Then, again, the economic factor is back of the practice of following potatoes with potatoes year after year on this high-priced land because they are a high-income crop that can be produced with a comparatively low labor supply.

Dr. Chitwood said we can think of Long Island in comparison with England. The golden nematode got to England perhaps shortly after 1900 and it was 1944 before it had infested about half the potato acreage in that compact country. On such a basis, with no very successful method to stop the spread, he says we could reasonably expect it would require 100 years for the pest to bring the potato growing industry of the United States to England's present condition of 50 per cent infes-

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A Machine for Deep Fertilizer Placement[1]

By A. C. Caldwell and C. O. Rost

Division of Soils, University of Minnesota, St. Paul, Minnesota

WHILE working with the fertilizer attachment for the plow, it early became apparent to the authors that this machine for deep placement of fertilizer was not all that could be desired. There are a number of drawbacks which render the implement rather ineffective. For one thing the hopper is too small. The plow attachment is satisfactory for experimental work in which modest amounts of fertilizer are applied, but applying fertilizer on an 80-rod strip at 1,000 pounds per acre involves filling the hopper every half round—and no farmer relishes that prospect. One feature a satisfactory machine for deep fertilizer placement should have is hopper capacity.

Another objection to the present plow attachment is the height at which it rides. It is no mean hoist to lift a 100-pound bag of fertilizer and empty it into a hopper the top of which is about five feet from the ground.

Add to the above major inconveniences such relatively minor objections as loss and scattering of fertilizer at the ends of the field, the lack of flexibility in depositing fertilizer only on the plow sole, and the extra weight of attachment and fertilizer borne by the plow, and quite a case can be built

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[1] Paper No. 547 of the Miscellaneous Journal Series, Minnesota Agricultural Experiment Station. St. Paul 8, Minnesota.

This fertilizer-placement machine was manufactured by the E. S. Gandrud Company, Owatonna, Minnesota.

A string of tempting fish is the reward to an efficient pond owner.

Mistakes Versus Essentials of Pond Management for Fish

By Verne E. Davison

Southeastern Regional Biologist, Department of Agriculture Soil Conservation Service, Spartanburg, South Carolina

POND management is much simpler than most folks imagine. There are a dozen ways to mismanage a fishpond, and some ponds cannot be well managed. In either case the wrong techniques are more complicated and more difficult than the few essential practices which produce good fishing.

Since 1941, soil conservationists in the Southeastern Region of the Soil Conservation Service have encouraged owners in pond management for fish. Most of these ponds are a source of satisfaction, pleasure, and good food. I wish I could say, "Every pond will demonstrate successful fish management;" but unfortunately some of them will not provide good fishing because owners have made mistakes.

We have studied dozens of ponds that were constructed, stocked, fertilized, fished, and otherwise managed as a part of the soil and water conservation activities of farmers who are cooperators of soil conservation districts. Even soil conservationists at first had their doubts relative to these surprising techniques, developed by Swingle and Smith, Alabama Agricultural Experiment Station. The technicians and farmers were entitled to doubts until they had living proof in their own communities; but the time for mistakes and doubt has just about run its course in the Southeast. Almost every technician who began pond work as long as two or three years ago now can point to many successful farm fish-

ponds for each disheartening example.

Introducing a new set of water management techniques certainly has its trials. Our technicians encounter the full barrage of questions and arguments about fish management—for old ponds as well as new. A few folks honestly admit, "I don't know anything about managing fishing waters, but I like to fish." You would think, however, from the freely given advice handed out over the counter and from the barber's chair, that a fishing license is generally regarded as a permit for the professional practice of fish culture.

It has been fun to dip a minnow seine in the shallow edges of hundreds of ponds from Virginia and Kentucky south to Mississippi and Florida and show the surprised owners and our own technicians the simple, easy ways to tell what most ponds need in management. Few people really know what conditions exist within their ponds. Everyone seems concerned to protect the little fish from snakes and birds and turtles and bass and the so-and-so who would take anything less than the "big ones." But if there's pleasure in success, there's balancing heartbreak in the failures. If I have failed to find every way in which a pond can be mismanaged, it's probably because I'm only 42 years old. Nevertheless, I fear I'll see more ways and hear more owners say, "I didn't know. My best friend told me to do it. What can I do now to correct it?"

Offered here is a list of five essential, easy things that must be done to have the best fishing in farm ponds.

1. It is essential to protect each pond from muddiness and too much water. This can be done best by selecting a site on a small drainage area and keeping it well vegetated to prevent erosion. In many situations the pond can be given additional protection with a diversion ditch to carry excess water around. Pond management is chiefly water management where fertilization is a hopeless task if the pond continually refills with fresh water and washes out that which has been fertilized. The construction must be as water-tight as possible, and safe.

2. It is essential to keep a pond free from weeds, grass, brush, trees, and other debris or obstruction. Fishing will be more pleasant and successful. More of the fish will be large enough to use. The pond area, therefore, must

A pond produces fish according to the fertility of the water. Good pastures in the Southeast are made with the help of nitrogen, phosphorus, and potash; so also are good fishponds.

A well-managed pond is a delightful part of a farm.

be cleared completely before water is impounded; and shallow water should be eliminated to avoid troublesome weed growth.

3. It is essential to fertilize pond water. Submerged water weeds and mosquitoes can be kept out in this way. Fertilized waters produce a heavy yield of fish and make fishing more successful. Mineral fertilizers to make up the equivalent of 500 to 1,500 pounds of an 8-8-4 are required per acre annually. Without nitrogen, phosphorus, and potash, a pond will be no better than ordinary. And organic fertilizers like barnyard manure will not do the job as well.

4. It is essential to begin with approximately 100 bass and 1,000 to 1,500 bluegills per acre. More are too many. A few adults won't do, and no other kinds of fish have been managed very successfully in small farm ponds.

5. It is essential that a pond be fished —removing usable fish by hook and line — without regard for spawning season, size, kind, or numbers. The number of pounds removed will govern the number of pounds produced. The food, formerly consumed by those caught, then becomes available to those remaining. The fish themselves will limit the angler's catch, leaving a big margin of safety in breeding stock.

To summarize: These five essentials will produce excellent fishing without any other measures. To make each pond manageable requires a little common sense when selecting sites and constructing the reservoirs. Management requires a reasonable amount of work and expense to apply fertilizer and control vegetation around the pond edges. It is important, therefore, that effort and thought be concentrated on the essential things and not dissipated on the unnecessary or incorrect practices, several of which are listed as follows:

1. Stocking a well-fertilized pond with less than 100 bass per acre is wrong. Any Southern pond without bass is no good. Stocking with adult bluegill in numbers substantially below 1,000 per acre is wrong (if the pond is to be well fertilized).

2. Stocking ponds with crappie, catfish, or any species other than bass and bluegills is not likely to produce continuous fishing. No other combina-

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County Agent O. B. Elliott (left) and D. W. Fortenberry, Soil Conservationist of Walthall County look over the crimson clover of W. I. Conerly which made the Walthall dairyman $17 a day more money. This included the increased production of milk and the decreased use of feed.

Pastures in Mississippi Produce Profits

By Jack Flowers

Mississippi State College, State College, Mississippi

WHEN a dairy farmer increases his income $17 a day from 17 acres of crimson clover, it is no wonder that Walthall County farmers are working out pasture programs second to none in Mississippi or the South.

The success of their pasture programs in one of the most progressive rural counties in Mississippi is due to the fact that a definite plan was made before the projects were started. The Soil Conservation Service, Extension Service, and AAA pooled their planning and assistance and formulated a plan which couldn't miss. From a soil type standpoint, land-use is being carried on more pastures where formerly workers and farmers believed clover and grass would not grow profitably. Dairy and beef cattle interests are increasing because these enterprises now can be and are a profitable enterprise, where formerly without pastures they were not paying off comparable to cotton production.

At this time when the one-crop system is admittedly obsolete, Walthall County farmers are hinging on livestock as the base of their agricultural program. The first essential of the livestock program is ample pasture and feed. Since a good pasture is the most practical and economical source of feed, they are endeavoring to establish a 12-month pasture or grazing program.

A system has been developed by these pasture-minded farmers to the extent that almost year-round grazing can be had and yet the program is economically sound and has proved to be practical.

A car of muriate of potash is being used in Walthall for an intensive pasture demonstration program. This potash program is being supervised by D. W. Fortenberry of the Soil Conservation Service, in cooperation with O. B. Elliott, County Agent.

Potash was used on more than 75 farms and on the various soil types of the County. It was applied on strips across the pastures at the rate of 200 pounds per acre and was plowed in along with the other minerals used. It is believed that this amount of potash will be sufficient to last from two to four years, and during this period the results will be observed.

If such a thing as a permanent pasture exists in Walthall County, it would be a mixture of White Dutch clover and Dallis grass. This mixture of 10 pounds White Dutch seed and 15 pounds imported Dallis grass per acre has proved most satisfactory.

At first lespedeza was recommended as a part of this mixture, but with a good stand and growth of White Dutch, lespedeza cannot survive. However, lespedeza and Dallis grass are used as a summer and fall pasture and afford good grazing. To supplement the summer and fall pasture, Alyce clover, following crimson clover, can be used to great advantage especially during dry summers and falls.

It has been proved that year-round grazing can be had in Walthall County with proper management, fertilization, and seeding. White Dutch clover is usually ready by March 1 and will last through May. The Dallis grass will continue through the summer and fall until frost. Combination of Dallis and lespedeza will supplement the Dallis grown in with the White Dutch. Alyce clover can be grazed beginning August 15 until frost. The earliest for grazing oats has been October 15, but good grazing has been had during November, December, January, and February. Sericea and kudzu are proving to be good summer and fall grazing.

The success of a pasture program depends largely upon the farmers' willingness to establish pastures correctly, according to County Agent O. B. Elliott. All land going into pasture should be thoroughly plowed and disked and allowed to settle well with two or more rains. Fertilizer should be added before disking. During October, planting should be done at the rate of 10 pounds of White Dutch to the acre.

A light harrowing is necessary just ahead of seeding, but one should not attempt to cover seed after broadcasting. Dallis grass should be planted in Walthall during the last two weeks in December or the first two weeks in January at the rate of 15 pounds per acre. The best results obtained with this mixture were where a ton of basic slag and 200 pounds of potash were applied before seeding.

One ton of limestone and 500 pounds of superphosphate (20 per cent) will replace one ton of slag. One thousand pounds of basic slag and 50 pounds of potash are the annual application of fertilizer on established pasture.

Balanced Sod

Fertilization has more to do in keeping a balanced, desired mixture of clovers and grasses than any other one thing. Mowing and proper or controlled grazing are the next most important factors in maintaining a desirable pasture mixture.

Some farmers who do not have improved pastures question the sound economics of such a program. The best proof of its soundness is that the dairymen who have such a program say that they would not continue milking unless they could have this year-round grazing. The beef cattlemen are maintaining their pastures and increasing the acreage as the number of cattle make the demand for more pasture.

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Potash: The Sugar Maker

By George D. Scarseth

Director of Research, American Farm Research Association, Lafayette, Indiana

MEET Old Man Potash! He is not just the last figure in a common mixed fertilizer, as 2-12-6, where he is used in as diluted a quantity as economics and habits tolerate. He is the key tool of the Creator in giving us food for growth and warmth. He is the link that gears carbondioxide to water in plants to make the first organic compound—simple sugars. From these sugars the cell fibers and carbohydrates are built. He is the link that ties our earth to the universe as he packs the energy of the sunbeams into storage materials that make the plant, the wood, and the seed. The atom-smashers even suspect that he also feels the impact of cosmic beams. They even suspect that the calcium of our limestones came from potash before potash was calmed down with age and was charged with the electrons of the stardust. We know that potash is part of life itself, because in the living plant it will not leak out of the cells as long as the cells are alive; but once the cells are dead as when hay is dried, a rain will wash nearly all the potash out.

Nutrient Balance

We know potash is a close kin to calcium and magnesium of dolomitic limestone, and that when too much calcium (overliming effect) is swept into the plant both potash (called potassium as the pure element) and magnesium have a hard time getting in; so much so that the plant may suffer unless more is supplied. Likewise, if a lot too much potash, as in some old greenhouse soils, accumulates to enter the plant in excessive quantities the plants may starve for calcium and magnesium. The balance between calcium, magnesium, and potash is most important.

Grandmother knew potash in soft soap made from potash lye. She knew soda lye made hard soap. The Indians must have noted that a fish buried under a corn hill where a brush pile had burned made a bigger corn plant than where there had been no ashes to furnish potash and other minerals. Today a farmer wants to know that when he hauls off his field one load of legume hay he is removing as much potash (K_2O) as would be contained in about 750 pounds of 2-12-6 (the leading fertilizer grade sold in the U. S. A.) or in 75 pounds of muriate of potash (this is the 60% potash material produced at the mines).

The farmer wants to know that potash is lost in cattle urine. In one year the urine from one cow will contain as much potash as in 1,000 pounds of 2-12-6 or 100 pounds of 60% muriate of potash. Not all of this is returned to the fields and when returned is not spread evenly. Agronomists at the Vermont station have shown that urine spots contained added nutrients that on an equivalent acre basis amounted to about 5,560 pounds of a 10-0.1-11 fertilizer. The vegetation on such a spot is obviously oversupplied with nitrogen and potash and extremely deficient in phosphorus.

The farmer loses potash in erosion, water run-off, and in manures as well as by crop removal. Dr. A. R. Midgley of Vermont has shown that on a 15-cow farm just to make up for these losses from all sources would require an annual purchase of potash in 1,660 pounds of an 0-20-20 or 5,500 pounds

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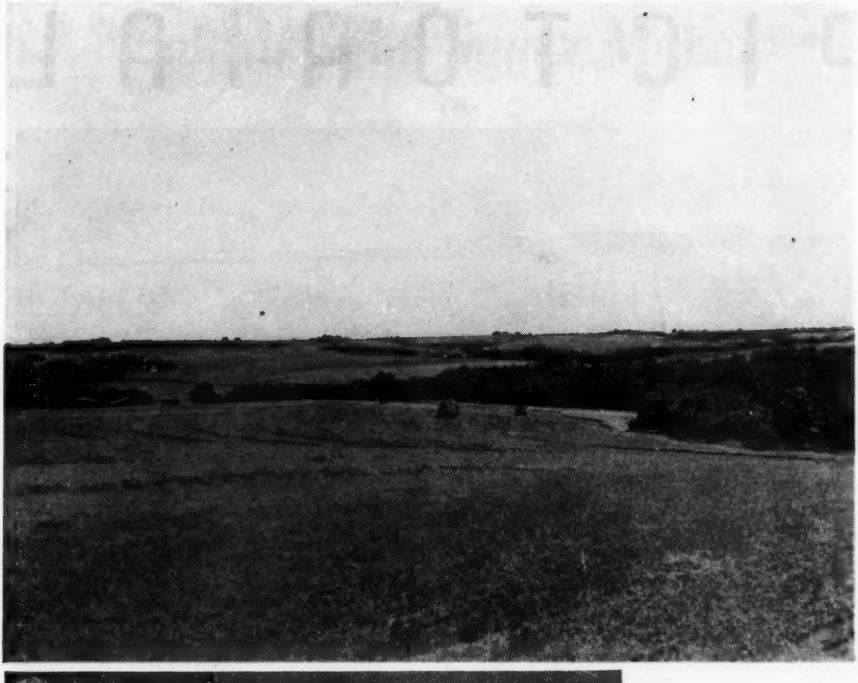
PICTORIAL

Sustenance for a Starving World



Haying

Harvesting

Above: Haying and harvesting usually include "all hands" on the farm.

Below: Modern methods lessen the manpower required.

The Editors Talk

Understanding F. A. O.

To many the FAO may mean just another of the almost countless government organizations known by their initials during and since the war. To the informed the Food and Agricultural Organization of the United Nations is one of the greatest hopes of mankind for peace and plenty in the future.

Secretary of Agriculture Clinton P. Anderson believes that perhaps the most important single task facing FAO is to gain wide understanding of its purposes and its methods among all groups of people in every nation in the world. Speaking before the 37th Annual Convention of Rotary International in Atlantic City, New Jersey, June 5, 1946, the Secretary explained FAO and its importance to all of our citizens in terms understandable and satisfactorily brief enough to be usable in disseminating information.

"FAO is the first tangible, operating agency the nations of the world ever have set up to attack the problem of hunger at its roots," he said. "Its primary objective is to help nations of the world to expand both the supply and the effective demand for food so that the earth's two billion men, women, and children may have a better living. It seeks to bring new standards of nutrition to the world, and the means to meet those standards. It hopes to lift the curse which has kept two-thirds of the world's people perpetually underfed.

"The job of FAO is colossal. Decades and generations must pass before FAO can hope to say that it has achieved material success. But it is a genesis.

"Already, we have seen an important example of what it means to have a permanent international food organization. The Director General of FAO, Sir John Boyd Orr, called a Special Meeting on Urgent Food Problems to convene two weeks ago in Washington. I was happy to serve as chairman of the meeting, and as the United States delegate to point out that the Combined Food Board was a war agency that had outgrown its boots and should be succeeded by an agency organized and directed specifically toward meeting the new situation.

"The conference set something of a speed record for international gatherings. Within a week, it saw the creation of the International Emergency Food Council, which will have its first meeting on June 20th and will begin to function. It will look at food supplies and food needs on a global basis. It will not give orders, but it will seek export commitments from the exporting nations and will put those in the balance against the import requirements. It will provide a common meeting ground where the nations can agree on food conservation measures and production measures. And if the time comes that exports of any commodity could exceed the import requirements, all of the nations will know it and can use that knowledge to plan appropriate action."

Secretary Anderson went on to say that what we want in the world—and what we hope to promote through FAO and other organizations of the United Nations—is an increasingly productive agriculture, balanced by an increasingly productive

industry. Only in that way can there be more food and more products to divide among all of us.

"Another major aim is that of developing the less-advanced countries. Fully two-thirds of the earth's population haven't the facilities or the techniques for producing enough to eat or wear, and people with a low standard of living are a serious threat to the living standards and safety of the rest of the world. From a strictly business point of view, production and markets can be expanded only if those who are now inefficient and underfed are enabled to do their full share of producing and consuming. They represent the greatest untapped markets in the world.

"But there is far more to the FAO job than coordination of production and trade. It must also promote research, education, and production techniques to lift the quantity, quality, and efficiency of agricultural production. This is a very definite, well-charted route toward better living. In the United States a close tie-up between our education, research, and agriculture goes back nearly a century in the work of the Department of Agriculture and the establishment of the Land Grant Colleges.

"Now, in about 3,000 counties, county agricultural agents work with farmers on one hand, and keep in touch with agricultural colleges on the other. When a new and better crop variety is developed, it gets into our fields just as fast as possible. Through this extension service system science is translated into everyday farm practice. There is nothing quite like this system in the rest of the world. But we hope there will be. FAO will stimulate and aid the establishment of similar systems in other lands. And it will act as a global clearing house of agricultural knowledge from all parts of the world."

Among other things, therefore, FAO is designed to be a world agricultural extension service. Anyone familiar with what the Extension Service has meant to the agriculture of the United States cannot help but place faith in the Food and Agricultural Organization and trust that it will receive the full cooperation which it deserves.

Controlling Weeds

The weed season is at hand. How much pleasanter would be the summer days of farmer and urbanite with lawn and garden if there were no such pesky thing as a weed. Methods of cultivation have been devised and new chemicals introduced for weed control—many of them successful. Appearing rather radical, perhaps, is the use of fertilizer in weed control, especially to those to whom it seems a weed will grow faster than anything else. Yet, L. B. Miller, Assistant Chief, Soil Experiment Fields, University of Illinois College of Agriculture, is credited with the statement that weed control is easier on soils kept fertile by use of lime, phosphate, and potash where needed, and by crop rotation.

"Although well-treated land holds much more water than poor land, the soil surface dries more quickly, making the land workable sooner. Thus good land can be cultivated to destroy weeds sooner after a rain than can poor land," Mr. Miller maintains.

"Weeds constitute nature's way of trying to prevent soil loss through leaching and erosion, but for all their good intentions they are not desirable compared with crop plants which, if properly used, are more effective and easier to control.

"While weeds, like crop plants, make more vigorous growth on fertile soil, good crop varieties respond more actively to good soil than do weeds, and competition from the weeds is relatively reduced. Most common field crops planted in a fertile, well-prepared seedbed will outstrip the annual weeds and make control of them rather easy."

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1920.....	15.9	17.3	125.3	141.7	61.8	182.6	16.46	25.65	....
1921.....	17.0	19.5	113.3	113.1	52.3	103.0	11.63	29.14	....
1922.....	22.9	22.8	65.9	100.4	74.5	96.6	11.64	30.42	....
1923.....	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941.....	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942.....	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943.....	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	40.8	149.0	192.0	109.0	141.0	16.40	52.70	....
1945									
June.....	20.90	51.2	180.0	220.0	111.0	150.0	15.90	52.50	....
July.....	21.25	56.3	183.0	230.0	112.0	146.0	15.40	55.00	....
August.....	21.33	44.9	167.0	256.0	113.0	145.0	14.60	52.50	....
September...	21.72	43.2	138.0	207.0	112.0	145.0	14.30	51.40	....
October.....	22.30	45.9	126.0	180.0	113.0	151.0	14.30	51.00	....
November...	22.52	46.7	131.0	186.0	111.0	153.0	14.90	51.30	....
December....	22.84	43.8	137.0	194.0	109.0	154.0	15.40	51.40	....
1946									
January.....	22.36	36.3	145.0	208.0	110.0	154.0	15.70	50.90	....
February.....	23.01	33.9	146.0	223.0	111.0	155.0	15.80	50.30	....
March.....	22.70	31.9	157.0	236.0	114.0	158.0	16.30	47.50	....
April.....	23.59	42.9	162.0	245.0	116.0	158.0	15.00	48.00	....
May.....	24.00	43.0	157.0	251.0	135.0	170.0	14.80	49.60	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1920.....	128	173	180	161	96	207	139	114	....
1921.....	137	195	163	129	81	117	98	129	....
1922.....	185	228	95	114	116	109	98	135	....
1923.....	231	190	133	137	129	105	110	183	....
1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	93	81	109	74	87	110
1938.....	69	196	80	83	76	64	57	97	88
1939.....	73	154	100	85	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	107	117	107	81	211	129
1942.....	153	369	168	136	143	124	91	202	163
1943.....	160	405	188	232	174	154	125	231	245
1944.....	167	408	214	219	170	160	138	234	212
1945									
June.....	169	512	258	251	173	170	134	233	269
July.....	171	563	263	262	174	165	130	244	244
August.....	172	449	240	292	176	164	123	233	240
September...	175	432	198	236	174	164	120	228	159
October.....	180	459	181	205	176	171	120	226	181
November....	182	467	188	212	173	173	126	227	235
December....	184	438	197	221	170	174	130	228	223
1946									
January.....	180	363	208	237	171	174	132	226	249
February.....	186	339	209	254	173	175	133	223	275
March.....	183	319	225	269	178	179	137	211	283
April.....	190	429	232	279	181	179	126	213	282
May.....	194	430	225	286	210	192	125	220	177

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Fish scrap, wet acidulated 6% ammonia, 3% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.05	$3.37	$3.52
1922	3.04	2.58	6.07	4.66	3.54	4.75	4.99
1923	3.02	2.90	6.19	4.83	4.25	4.59	5.16
1924	2.99	2.44	5.87	5.02	4.41	3.60	4.25
1925	3.11	2.47	5.41	5.34	4.70	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.15	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.35	4.32	5.70
1928	2.67	2.30	7.06	6.63	5.28	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.69	4.61	5.72
1930	2.47	1.81	4.78	4.96	4.15	3.79	4.58
1931	2.34	1.46	3.10	3.95	3.33	2.11	.46
1932	1.87	1.04	2.18	2.18	1.82	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.58	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.84	2.67	3.27
1935	1.47	1.15	4.59	3.10	2.65	3.06	3.65
1936	1.53	1.23	4.17	3.42	2.67	3.58	4.25
1937	1.63	1.32	4.91	4.66	3.65	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.17	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.12	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.35	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.27	3.76	4.43
1942	1.74	1.41	6.11	5.77	3.34	5.04	6.76
1943	1.75	1.42	6.30	5.77	3.34	4.86	6.62
1944	1.75	1.42	7.68	5.77	3.34	4.86	6.71
1945							
June	1.75	1.42	7.81	5.77	3.34	4.86	6.71
July	1.75	1.42	7.81	5.77	3.34	4.86	6.71
August	1.75	1.42	7.81	5.77	3.34	4.86	6.71
September	1.75	1.42	7.81	5.77	3.34	4.86	6.71
October	1.75	1.42	7.81	5.77	3.34	4.86	6.71
November	1.75	1.42	7.81	5.77	3.34	4.86	6.71
December	1.75	1.42	7.81	5.77	3.34	4.86	6.71
1946							
January	1.75	1.42	7.81	5.77	3.34	4.86	6.71
February	1.75	1.42	7.81	5.77	3.34	4.86	6.71
March	1.75	1.42	7.81	5.77	3.34	4.86	6.71
April	1.75	1.42	7.81	5.77	3.34	4.86	6.71
May	1.75	1.42	9.07	7.59	3.34	4.86	7.30
Index Numbers (1910-14 = 100)							
1922	113	90	173	132	117	140	142
1923	112	102	177	137	140	136	147
1924	111	86	168	142	145	107	121
1925	115	87	155	151	155	117	135
1926	113	84	126	140	146	129	139
1927	112	79	145	166	143	128	162
1928	100	81	202	188	173	146	170
1929	96	72	161	142	154	137	162
1930	92	64	137	141	136	12	130
1931	88	51	89	112	109	63	70
1932	71	36	62	62	60	36	39
1933	59	39	84	81	85	97	71
1934	59	42	127	89	93	79	93
1935	57	40	131	88	87	91	104
1936	59	43	119	97	89	106	131
1937	61	46	140	132	120	120	122
1938	63	48	105	106	104	93	100
1939	63	47	115	125	102	115	111
1940	63	48	133	124	110	99	96
1941	63	49	157	151	107	112	126
1942	65	49	175	163	110	150	192
1943	65	50	180	163	110	144	189
1944	65	50	219	163	110	144	191
1945							
June	65	50	223	163	110	144	191
July	65	50	223	163	110	144	191
August	65	50	223	163	110	144	191
September	65	50	223	163	110	144	191
October	65	50	223	163	110	144	191
November	65	50	223	163	110	144	191
December	65	50	223	163	110	144	191
1946							
January	65	50	223	163	110	144	191
February	65	50	223	163	110	144	191
March	65	50	223	163	110	144	191
April	65	50	223	163	110	144	191
May	65	50	259	215	110	144	207

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Kainit, 20% bulk, per unit, c.i.f. Atlantic and Gulf ports
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657	$0.655
1922	.566	3.12	6.90	.632	.904	23.87	....	.508
1923	.550	3.08	7.50	.588	.836	23.32	....	.474
1924	.502	2.31	6.60	.582	.860	23.72	....	.472
1925	.600	2.44	6.16	.584	.860	23.72	....	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537	.524
1927	.525	3.09	5.50	.646	.924	25.55	.586	.581
1928	.580	3.12	5.50	.669	.957	26.46	.607	.602
1929	.609	3.18	5.50	.672	.962	26.59	.610	.605
1930	.542	3.18	5.50	.681	.973	26.92	.618	.612
1931	.485	3.18	5.50	.681	.973	26.92	.618	.612
1932	.458	3.18	5.50	.681	.963	26.90	.618	.591
1933	.434	3.11	5.50	.662	.864	25.10	.601	.565
1934	.487	3.14	5.67	.486	.751	22.49	.483	.471
1935	.492	3.30	5.69	.415	.684	21.44	.444	.488
1936	.476	1.85	5.50	.464	.708	22.94	.505	.560
1937	.510	1.85	5.50	.508	.757	24.70	.556	.607
1938	.492	1.85	5.50	.523	.774	15.17	.572	.623
1939	.478	1.90	5.50	.521	.751	24.52	.570	.670
1940	.516	1.90	5.50	.517	.730	24.75	.573	....
1941	.547	1.94	5.64	.522	.780	25.55	.570	....
1942	.600	2.13	6.29	.522	.810	25.74	.205	....
1943	.631	2.00	5.93	.522	.786	25.35	.195	....
1944	.645	2.10	6.10	.522	.777	25.35	.195	....
1945								
June	.650	2.20	6.20	.471	.701	22.88	.176	....
July	.650	2.20	6.20	.503	.749	24.44	.188	....
August	.650	2.20	6.20	.503	.749	24.44	.188	....
September	.650	2.20	6.20	.503	.749	24.44	.188	....
October	.650	2.20	6.28	.535	.797	26.00	.200	....
November	.650	2.20	6.40	.535	.797	26.00	.200	....
December	.650	2.20	6.40	.535	.797	26.00	.200	....
1946								
January	.650	2.20	6.40	.535	.797	26.00	.200	....
February	.650	2.20	6.40	.535	.797	26.00	.200	....
March	.650	2.20	6.40	.535	.797	26.00	.200	....
April	.650	2.20	6.40	.535	.797	26.00	.200	....
May	.650	2.20	6.40	.535	.797	26.00	.200	....
Index Numbers (1910-14 = 100)								
1922	106	87	141	89	95	99	....	78
1923	103	85	154	82	88	96	....	72
1924	94	64	135	82	90	98	....	72
1925	110	68	126	82	90	98	....	74
1926	112	88	114	83	90	98	82	80
1927	100	86	113	90	97	106	89	89
1928	108	86	113	94	100	109	92	92
1929	114	88	113	94	101	110	93	92
1930	101	88	113	95	102	111	94	93
1931	90	88	113	95	102	111	94	93
1932	85	88	113	95	101	111	94	90
1933	81	86	113	93	91	104	91	86
1934	91	87	110	68	79	93	74	72
1935	92	91	117	58	72	89	68	75
1936	89	51	113	65	74	95	77	85
1937	95	51	113	71	79	102	85	93
1938	92	51	113	73	81	104	87	95
1939	89	53	113	73	79	101	87	93
1940	96	53	113	72	77	102	87	....
1941	102	54	110	73	82	106	87	....
1942	112	59	129	73	85	106	84	....
1943	117	55	121	73	82	105	83	....
1944	120	58	125	73	82	105	83	....
1945								
June	121	61	127	66	74	95	80	....
July	121	61	127	70	79	101	82	....
August	121	61	127	70	79	101	82	....
September	121	61	127	70	79	101	82	....
October	121	61	129	75	84	108	83	....
November	121	61	131	75	84	108	83	....
December	121	61	131	75	84	108	83	....
1946								
January	121	61	131	75	84	108	83	....
February	121	61	131	75	84	108	83	....
March	121	61	131	75	84	108	83	....
April	121	61	131	75	84	108	83	....
May	121	61	131	75	84	108	83	....

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer materials‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash
1922.....	132	149	141	116	101	145	106	85
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	150	94	57	160	117	77
1944.....	195	176	151	96	57	174	120	76
1945								
June.....	206	180	155	95	57	175	121	69
July.....	206	180	154	96	57	175	121	74
August....	204	180	154	96	57	175	121	74
September.	197	181	153	96	57	175	121	74
October...	199	182	154	97	57	175	121	78
November.	205	182	156	97	57	175	121	78
December.	207	183	156	97	57	175	121	78
1946								
January...	206	184	156	97	57	175	121	78
February..	207	185	156	97	57	175	121	78
March....	209	187	158	97	57	175	121	78
April.....	212	188	160	97	57	175	121	78
May.....	211	192	162	100	57	195	121	76

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning with June 1941, manure salts prices are F. O. B. mines, the only basis now quoted.

**** The annual average of potash prices is higher than the weighted average of prices actually paid because since 1926 better than 90% of the potash used in agriculture has been contracted for during the discount period. From 1937 on, the maximum seasonal discount has been 12%.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"The Fertilizer Trade in Canada," Dom. Bur. of Statistics, Dept. of Trade and Com., Ottawa, Can., July 1, 1944-June 30, 1945, W. H. Losee.

"The Effects of Fertilizer Treatments, Curing, Storage, and Cooking on the Carotene and Ascorbic Acid Content of Sweetpotatoes," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., So. Coop. Series, Bul. 3, Dec. 1945, M. Speirs, H. L. Cochran, W. J. Peterson, F. W. Sherwood, and J. G. Weaver.

"Official Inspections 197," Agr. Exp. Sta., Univ. of Maine, Orono, Maine, Oct. 1945.

"Fertilizer Recommendations in Mississippi, 1946," Agr. Exp. Sta., Miss. State College, State College, Miss., Cir. 124, Dec. 1945, Clarence Dorman.

"Analyses of Commercial Fertilizers," N. C. Dept. of Agr., The Bul. 111, March 1946. "Results of Agronomic Research on the Use of Lime and Fertilizers in Ohio," Dept. of Agron., Ohio Agr. Exp. Sta., Wooster, Ohio, Agron. Mimeo. 96, Revised Dec. 6, 1945, R. E. Yoder.

"Inspection and Analysis of Commercial Fertilizers," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Bul. 363, Dec. 1945, H. J. Webb.

"Fertilizer Recommendations for South Carolina," Agr. Ext. Serv., Clemson Agr. College, Clemson, S. C., Cir. 283, April 1946, H. A. Woodle.

"Fertilizer Tonnage Sales Survey Report for Washington for July 1, 1944 to June 30, 1945," Agr. Exp. Sta., State College of Wash., Pullman, Wash., Mimeo. Cir. 34, April 1946, S. C. Vandecaveye.

"Prewar World Production and Consumption of Plant Foods in Fertilizers," U.S.D.A., Washington, D. C., Misc. Publ. 593, April 1946, K. G. Clark and Mildred S. Sherman.

Soils

"Chemical Methods of Soil Analysis," Central Exp. Farm, Div. of Chem., Ottawa, Canada, Feb. 1946.

"Soil and Water Conservation in New Hampshire," Gen. Ext. Serv., Univ. of N. H., Durham, N. H., Ext. Folder 12, Oct. 1945.

"Improving Land the Modern Way," Ext. Serv., R. I. State College, Kingston, R. I., Ext. Bul. 94, June 1945, C. R. Creek and J. F. Hauck.

"Management of Soils in the Lower Rio Grande Valley," Agr. Exp. Sta., A. & M. College, College Station, Texas, Cir. 110, March 1946, B. S. Pickett.

"Soil Erosion in Small Irrigation Furrows," Agr. Exp. Sta., Utah State Agr. College, Logan, Utah, Bul. 320, Jan. 1946, O. W. Israelsen, G. D. Clyde and Cyril W. Lauritzen.

"Sprinkler Irrigation," Agr. Ext. Serv., State College of Wash., Pullman, Wash., Ext. Bul. 336, March 1946, Gustav H. Bliesner.

"Soil Survey of Lincoln County, Tennessee," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Ser. 1937, No. 16, Issued Feb. 1946, Foster Rudolph, L. J. Strickland, E. F. Henry, Robert Wildermuth and B. H. Williams.

"Review of Principal Results, 1945," S.C.S., So. Piedmont Conservation Exp. Sta., Watkinsville, Ga., May 1, 1946, B. H. Hendrickson, John R. Carreker and William E. Adams.

"Soil Conservation Service Research Summaries, Part II," U.S.D.A., Washington, D. C., Jan. 1946, J. H. Stallings.

Crops

A new "Handbook for Agricultural Workers 1945-46" has been published by the Agricultural Extension Service, North Carolina State College, Raleigh, North Carolina, covering the important data on agriculture and including recommended practices on agricultural engineering, agronomy, animal husbandry, dairy husbandry, entomology, fruit spray schedules, horticulture, plant pathology, and poultry. The pocket size volume is, as its name implies, a most convenient ready fund of information. The little book sells for 60¢ and the Station prefers some form of money order or check made out to the Extension Emergency Fund. They do not wish to receive stamps.

"Addresses and Proceedings, Potato Section, Ontario Crop Improvement Association," Ont. Dept. of Agr., Crops, Seeds, & Weeds Branch, Toronto, Ont., Can., Feb. 11, 1946.

"Avocado Production in Florida," Agr. Ext. Serv., Gainesville, Fla., Bul. 129 (Rev. Bul. 112 and 272), March 1946, H. S. Wolfe, L. R. Toy, A. L. Stahl, (Rev. by H. S. Wolfe).

"Fifty-seventh Annual Report of the Director," Ga. Exp. Sta., Univ. System of Ga., Experiment, Ga., July 1, 1944 to June 30, 1945.

"Varieties of Vegetables and Fruits Recommended for Freezing," Ext. Serv., Univ. of Md., College Park, Md., Ext. Mimeo 25, April 1946, Francis C. Stark, Jr.

"Production and Utilization of Silage in Mississippi," Agr. Exp. Sta., Miss. State College, State College, Miss., Bul. 425, Nov. 1945, H. W. Bennett, R. H. Means, W. C. Cowsert, O. A. Leonard, and Marvin Gieger.

"Soybean Varieties and Dates of Planting in the Yazoo-Mississippi Delta," Agr. Exp. Sta., Miss. State College, State College, Miss., Bul. 428, Jan. 1946, Paul R. Henson and Robert S. Carr.

"Dry Land Pasture Experiments at the Central Montana Branch Station, Moccasin, Montana," Agr. Exp. Sta., Montana State College, Bozeman, Mont., Bul. 431 (Rev. B. 388), Oct. 1945, Ralph M. Williams and A. H. Post.

"Measured Crop Performance, 1945," Agr. Exp. Sta., Univ. of N. C., Raleigh, N. C., Bul. 354, Jan. 1946, R. P. Moore and G. K. Middleton.

"1945 Rose Test at the Pennsylvania State College," Agr. Exp. Sta., Pa. State College, State College, Pa., Jn. Ser. Paper 1300, Dec. 13, 1945, E. I. Wilde and R. P. Meahl.

"The Cotton Contest—1945," Ext. Serv., Clemson Agr. College, Clemson, S. C., Cir. 278, March 1946, H. G. Boylston.

"Agricultural Research in South Dakota, Fifty-eighth Annual Report," Agr. Exp. Sta., S. D. State College, Brookings, S. D., July 1, 1944 to June 30, 1945.

"South Dakota Corn Performance Tests, 1945," Agr. Exp. Sta., S. D. State College, Brookings, S. D., Cir. 60, Jan. 1946, Karl F. Manke.

"Boysenberries and Youngberries," Agr. Ext. Serv., Univ. of Tenn., Knoxville, Tenn., S. Cir. 213, January 1946.

"Strawberry Growing in Washington," Agr. Ext. Serv., State College of Wash., Pullman, Wash., Bul. 246 (Rev.) March 1946, John C. Snyder.

"Pollination of Tree Fruits and Nuts," Agr. Ext. Serv., State College of Wash., Pullman, Wash., Bul. 342, April 1946, John C. Snyder.

"4-H Garden Club Outline," Agr. Ext. Serv., State College of Wash., Pullman, Wash., 4-H Club Cir. 24 (Rev.), March 1946, J. C. Dodge, D. H. Brannon, and C. T. Meenach.

"Gardening as a 4-H Project," Ext. Serv., Univ. of Wis., Madison, Wis., Cir. 4H-51, January 1946, O. B. Combs, T. C. Allen, R. E. Vaughan, and K. C. Berger.

"Descriptions of and Key to American Potato Varieties," U.S.D.A., Washington, D. C., Cir. 741, April 1946, C. F. Clark and P. M. Lombard.

Economics

"Connecticut Vegetable Industry and Its Outlook for 1946," Dept. of Agr., Bur. of Markets, Hartford, Conn., Bul. 93, April 1946.

"1945 Statistics of Diversified Agriculture in Hawaii," Agr. Ext. Serv., Univ. of Hawaii, Honolulu, T. H., Cir. 199, April 1946.

"Illinois Farm and Home Outlook for 1946," Ext. Serv., Univ. of Ill., Urbana, Ill., Cir. 600, Jan. 1946.

"Soybean Production Experience in Illinois," Agr. Exp. Sta., Univ. of Ill., Urbana, Ill., AE2345, Oct. 1945.

"Farm Ownership in Louisiana Financed Under the Bankhead-Jones Farm Tenant Act," Dept. of Agr. Econ., La. State Univ., Baton Rouge, La., Bul. 397, Aug. 1945, Willie Mae Alexander.

"Economics of Broomcorn Production in New Mexico," Agr. Exp. Sta., College of A. & M., State College, N. M., Bul. 326, Dec. 1945, Morris Evans.

"The New York Agricultural Outlook 1946," College of Agr., Cornell Univ., Ithaca, N. Y., Bul. 691, Jan. 1946.

"Agricultural Production to Meet 1946 Needs," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Cir. 70, Nov. 1945, G. H. Aull and M. J. Peterson.

"Land Ownership Trends in North Dakota Selected Years, 1929-1944," Agr. Exp. Sta., N. D. Agr. College, Fargo, N. D., Bul. 337, Dec. 1945, Lyman W. Wallin and Reuben Engelking.

"Membership Relations in Farmers' Cooperatives," Agr. Exp. Sta., Okla. A. & M. College, Stillwater, Okla., Cir. 122, April 1946, Adlowe L. Larson.

"Costs Materials and Practices in Growing Irish Potatoes on Cumberland Plateau," Dept. of Agr. Econ. & Rural Soc., Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Rural Res. Ser. Mono. 194, Jan. 15, 1946, F. N. Masters and C. C. Mantle.

"The Vermont Farm Outlook," Agr. Ext. Serv., Univ. of Vt., Burlington, Vt., April 1946, Roy S. Beck.

"The Farm Business and Farm Family Living as Related to Land Class in Nine Vermont Towns," Agr. Exp. Sta., Univ. of Vt., Burlington, Vt., Bul. 526, Dec. 1945, Robert M. Carter.

"Meeting Farm Production Needs for 1946," Ext. Serv., Va. Polytechnic Inst., Blacksburg, Va., Bul. 167, Jan. 1946.

"More Production Through Better Practices," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Bul. 320, Sept. 1945, D. M. Keyes.

"Keeping the Farm in the Family—A Study of Ownership Processes in a Low Tenancy Area of Eastern Wisconsin," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Res. Bul. 157, Sept. 1945, K. H. Parsons and E. O. Waples.

"Agricultural Statistics, 1945," U.S.D.A., Washington, D. C., 1945.

"Feed Grains and Meat Animals in War and Peace," U.S.D.A., Bur. of Agr. Econ., Wash., D. C., F. M. 51, Nov. 1945, C. W. Crickman.

"Farm Production in War and Peace," U.S.D.A., Bur. of Agr. Econ., Wash., D. C., F. M. 53, Dec. 1945, Glen T. Barton and Martin R. Cooper.

"Economics of Flax Production in Kansas," U.S.D.A., Bur. of Agr. Econ., Wash., D. C., Jan. 1946, Ned O. Thompson.

"The Flax Grower in Postwar Agriculture," U.S.D.A., Bur. of Agr. Econ., Wash., D. C., Dec. 1, 1945, Weber H. Peterson.

"Inheritance of Farm Real Estate, 1920-1945—A List of References," U.S.D.A., Wash., D. C., Libr. List 22, Jan. 1946, A. M. Hannay.

"Report of the Manager of the Federal Crop Insurance Corporation, 1945," U. S. D. A., Washington, D. C.

"The 12th Annual Report of the Farm Credit Administration 1944-45," U. S. D. A., Washington, D. C.

"Seven Steps to Help You Face the Future with Cotton," Ext. Serv., U. S. D. A., Washington, D. C., AIS-41, Jan. 1946.

"The Farm Real Estate Situation, 1944-45," U. S. D. A., Washington, D. C., Cir. 743, Oct. 1945, M. M. Regan, A. R. Johnson, and Fred A. Clarenbach.

"Federal Legislation, Regulations, and Rulings Affecting Cooperative Extension Work in Agriculture and Home Economics," U. S. D. A., Washington, D. C., M. P. 285 (Rev.) Jan. 1946.

"High-Level Food Consumption in the United States," U. S. D. A., Washington, D. C., M. P. 581, Dec. 1945, Willard W. Cochrane.

"Air Transport of Agricultural Perishables," U. S. D. A., Washington, D. C., M. P. 585, Jan. 1946.

"Facts About Cotton and Southern Farming," U. S. D. A., Washington, D. C., M. P. 594, Feb. 1946.

"Peacetime Adjustments in Farming Possibilities under Prosperity Conditions," U. S. D. A., Washington, D. C., M. P. 595, Dec. 1945.

"Marketing and Manufacturing Margins for Tobacco," U. S. D. A., Washington, D. C., T. Bul. 913, March 1946, L. D. Howell and Wade P. Young.

"1946 Agricultural Outlook Charts," U. S. D. A., Washington, D. C., Dec. 1945.

"Cropland Use and Soil Fertility Practice in War and Peace," U. S. D. A., Washington, D. C., F. M. 52, Jan. 1946, Donald B. Ibach.

"Current Developments in the Farm Real Estate Market," U S. D. A., Washington, D. C., March 1946.

"Cotton Quality Statistics United States 1944-45," U. S. D. A., Washington, D. C., CS-15, 1945.

"Annual Report on Tobacco Statistics 1945," U. S. D. A., Washington, D. C., CS-16, Dec. 1945.

Farm Population Shifts

The farm population comes out of the war not only fewer in numbers, but also with a change in age groupings, Dr. C. C. Taylor of the Bureau of Agricultural Economics points out. Between 1940 and 1945 the number of persons living on farms decreased by 5 millions, or more than 15 per cent. From 1940 to 1944 there was a loss of 40 per cent in the number of males between 14 and 24, and a drop of more than 20 per cent of those between 25 and 44. The number of persons 45 or over remained about the same.

Readjustments are to be expected, says Dr. Taylor. Some demobilized servicemen and industrial workers will return. How many will return depends largely on employment opportunities. Such movements respond sensitively to economic opportunities elsewhere. If widespread unemployment exists, there will probably be a considerable shift of people to farms.

"Shifting to non-farm jobs," says Dr. Taylor, "or combining them with farming has been an important means of raising the level of living of farm families. The amount of non-farm work done by farm operators during 1943 was 36 per cent greater than in 1939, while the wage income from such work increased by a much greater percentage."

The Newest Potato Pest—Golden Nematode

(*From page* 19)

tation. Spread in the intensive potato-growing areas could be slowed, he thinks, by diversified farming and by isolating fields.

So far, the only mandatory control is applied by New York State which has a primary regulation against the use of seed potatoes from infested or exposed fields for planting in other areas. The State also has taken some measures against the re-use of potato containers and requires thorough cleaning of farm implements that are to be moved from infested fields for use in fields outside the golden nematode area. There are, however, no regulations applying to the movement or cleaning of automobiles and trucks.

Checking up on what the pest has been doing geographically, State and Federal inspectors have found little indication of the presence of the pest outside the central area. Surveys covering practically all potato land on the island brought to light three new small infestations, none more than two miles out from the original area. Last year the Department surveyed potato areas in 17 northern and northeastern states but found no indication of the golden nematode in any of them.

Dynamic Sassafras Soils

(*From page* 15)

matter content is good and the soil is well supplied with total N, a condition about average for the virgin soils of the Coastal Plain.

The yield figures, although maximum yields were not obtained because the plants were not allowed to mature, bear out Dr. Hester's conclusion that although the Lansdale and Toledo soils have a greater potential, they have no greater producing power than the Sassafras sandy loam after fertilizer, lime, and minor elements are added. The yields of green and dry fruit on the three soils without added amendments were as follows:

	Grams	*Grams*
Sassafras sandy loam.....	38.4	5.2
Lansdale loam.....	160.5	8.8
Toledo.....	513.5	29.8

With fertilizer added, the yields on the three soils were—343.5 and 5.2, 946.5 and 56.2, and 971.5 and 59.3, showing that fertilizer increased the yield on the Sassafras sandy loam nearly 10 times while fertilizer on the Lansdale and Toledo increased yields about six and two times the yield before the fertilizer was added. When fertilizer, lime, and minor elements were added to the Sassafras sandy loam, the yield was about 24 times the yield of the virgin soil or 906.0 grams as compared with maximum yields of 976.5 and 971.5 grams on the Lansdale and Toledo respectively.

It is evident from the following table that fertilizer, lime, and minor elements are needed on a Sassafras sandy loam for highest yields of tomatoes and that when these are added its producing ability is nearly equal to that of soils which are far more fertile and have a greater potential. When fertilizer alone was added to the Sassafras sandy

Yields in grams	*Nothing added* Green-Dry wts.	*Fertilizer*	*Lime*	*Fertilizer and Lime*	*Fert., Lime, and Mn elements*
Sassafras sandy loam.....	38.4 5.2	343.5 5.2	200.5 8.6	817.5 45.8	906.0 55.3
Lansdale loam.....	160.5 8.8	946.5 56.2	206.5 9.7	895.5 54.6	976.5 57.6
Toledo.....	513.5 29.8	971.5 59.3	542.5 39.6	635.5 48.2	588.0 34.7

loam, the yield was increased nearly 10 times. With fertilizer, lime, and minor elements, the yield was increased about 24 times so that the maximum yield was nearly as great as the maximum yields on the other two soils. Of interest also is the fact that fertilizer alone gave the highest yield on the Toledo while on the Lansdale and Sassafras all of the plant-food elements were needed for maximum yield.

Summary of the Experiments

Eleven different soil types were brought to the greenhouse and placed in 3-gallon pots. Yield records were kept and analyses were made for sugars, vitamin C, titratable acids, and mineral and nitrogen content of the dried fruit. The amount of plant nutrients present in the soil, that taken from the soil by the fruit, and that removed from the soil by leaching are summarized.

Fertilizer increased the titratable acids in the fruit when used on the soil without lime while lime alone showed a decrease. Fertilizer and lime and fertilizer, lime, and minor elements improved the vitamin C, sugar, and general quality of the fruit. On the acid soils fertilizer increased the yield but did not produce a satisfactory crop. Lime increased the yield but did not give a satisfactory crop. Lime and fertilizer greatly increased the yield and quality of crop. The most satisfactory crop was secured when fertilizer, lime, and minor elements were added to the soil.

Sherman T. Perkins of Wrightstown, N. J., has been a member of the Ten-Ton Tomato Club for eight consecutive years which indicates that his production of tomatoes has been above the average. His soil is a typical Sassafras sandy loam and in 1941, for example, his yield was 19.2 tons per acre on 9.55 acres. He applied 1,500 pounds of hydrated lime, 1,200 pounds of a 4-8-10 fertilizer, and used a starter solution. Contrary to many experiences this large amount of fertilizer applied in the row has had no injurious effects on the plants.

Many other members of the Ten-Ton Club farm sandy loams and apply the fertilizer part before plowing and part in one or two side-dressings. Five of the six winners in 1945 followed this method of applying the fertilizer. It is generally conceded that on light soils the fertilizer should be applied in two or more applications.

Mistakes Versus Essentials of Pond Management

(*From page* 23)

tion is as simple to manage as bass and bluegills, and experimental results have proved no combination of fish as successful.

3. Brush and trees in a pond neither increase the fish nor make fishing better. Sand, gravel, or rock piles for spawning are entirely unnecessary. Pond fish will spawn adequately without them.

4. Addition of golden shiners, gizzard shad, top minnows, and other "base food" is unnecessary. The small bluegills and bass provide adequate food and will eat all mosquito larva in weedless ponds.

5. Screens across spillways are dangerous and largely unsuccessful. Little fish washed out even in great numbers are of no consequence—there will be that many more produced. Large fish go out only with deep flows through spillways—a condition avoidable by making wide spillways that spread the overflow thin (no more than 3 to 6 inches deep) and by avoiding flood waters, either by diversion ditches, or still better, by selecting sites on small watersheds.

6. Kingfishers, herons, fish ducks, and other birds have no material influence on fish in farm ponds. They eat only little fish of which every pond will have plenty. Only in hatcheries where thousands of fingerlings are kept in relatively little water are such birds undesirable.

7. Planting of water lilies, mosses, or other water weeds is, of course, detrimental. More fish are produced in weedless ponds than in those that are weedy.

8. Running water to "keep it fresh" is unnecessary. The plant and animal life, together with the sunlight, maintain a healthful condition for fish, livestock, and people even in waters remaining without "fresh" water entering.

9. Leaving stumps or putting wire, posts, broken glass, and other impediments in ponds to "keep some so-and-so from seinin' all the fish out" makes wading, swimming, and fishing unpleasant. Very few ponds can be seined heavily enough to reduce the brood stock substantially. Depth is usually sufficient guarantee against harmful seining.

10. Draining a pond to "dry it out for weed control" is not successful. Weeds that live beneath the surface can be killed and kept out with shade resulting from the dark green coloration of fertilized water; the roots of water lilies can be exhausted by cutting the leaves as they reach the surface of the water (several cuttings are necessary as exhaustion proceeds slowly); and cattails and similar "edge-weeds" can be kept under control by pulling them occasionally as they appear. Bluestone (copper sulphate), calcium arsenate, and other chemicals are less desirable for weed control as some weeds are not harmed substantially. Chemical poisons kill fish foods too, and the "successful" results are but temporary.

11. "Feeding" with stale bread, grain, or other foods is less efficient than fertilizer and contributes little to the poundage of fish when fed in the small quantities usually given. Five or ten pounds of such foods will probably produce one pound of fish—to add to the 500 pounds per acre supported in fertilized water.

12. The use of manures, cottonseed meal, hay, or other organic fertilizers is not so successful or productive of fish as inorganic chemical elements. Organic materials support the undesirable pond scums.

13. Closed seasons or "protected areas" are quite unnecessary in conservation of pond fish. In fact, the spawning beds of bluegills should be located and heavily fished if a high yield is to be harvested. It is foolish fear to refrain from catching fish whenever they will bite.

14. It is not necessary to fish the bass and bluegills in proportion to the original stocking for the purpose of keeping a balance. The bass will maintain a correct balance whether the owner takes only bass or only bluegills. To enjoy full use and to harvest the usable surplus, however, both bass and bluegills should be fished; the possible yield is approximately three pounds of blue gills for every pound of bass.

15. A narrow belief has been built up by contests and sports-lore that "catching the big ones" is the foremost (and, to some, the only) objective of fishermen and fish producers. To a

size-hungry fisherman, one should suggest the Gulf of Mexico or either of the two oceans bordering the United States. Now that pond owners know how to produce more fish, it is time to recognize as "master fisher" he who can produce the most pounds of fish per acre and catch delightful strings of fish frequently. Most people like small pan fish, and like to catch them, too, if the braggart and the contest winner does not bully them into embarrassment.

All of the foregoing 15 common, but futile practices, are an unnecessary waste of effort. And the worst of these wrong practices will ruin fishing in any pond. More than that, it is simpler and easier to do the five essential things which make farm pond fishing a pleasure—and put healthful food on the table.

Pastures in Mississippi Produce Profits

(*From page* 25)

White Dutch clover and Dallis will easily carry two head of cattle per acre for a period of four months, then one head per acre after the clover is gone for a period of five months, giving a total of nine months. Oats and crimson clover will provide grazing from October 15, when the oats are ready to graze, and then beginning February 1, the crimson will fill in until May 1.

The farmers in Walthall County have used a number of fertilizers in establishing white clover pastures. Some have used complete fertilizers such as 4-8-8 or 6-8-8; some combinations of lime, superphosphate, and potash. However, the most general practice recommended by county officials is one ton of basic slag and 200 pounds of muriate of potash at the time of establishing

Where the White Dutch runs out is where the fertilizer ran out. The plot to the right was treated with one ton of basic slag and 200 pounds of muriate of potash. The check to the left was plowed and seeded just like the other, but received no fertilizer. W. C. Smith, dairyman, shown at left, has some of the finest pastures in the county.

the pastures. To maintain the pastures, they are now using or recommending 1,000 pounds of basic slag and 50 pounds of potash annually. The heavy applications of fertilizer are applied at the time of establishing or renovating the pastures.

It is believed that reseeding of pastures will not be necessary in Walthall if they are renovated and properly fertilized when the clover begins to weaken, or shows signs of being crowded out by grass or objectionable weeds. This has been demonstrated on a number of farms.

Many thousands of pounds of seed have been wasted by broadcasting on land inadequately prepared and improperly fertilized. Preparing the land has been found to be very important, but under certain conditions white clover may be grown successfully without immediate preparation. For example, land properly prepared and fertilized for lespedeza makes an excellent seedbed for the beginning of a permanent pasture. However, it is important that the hay be cut fairly close to the ground, leaving a clean surface for seeding.

The large amount of nitrogen added to the soil by white clover stimulates the growth of Bermuda and other grasses, and if they are not grazed fairly close or mowed in the fall, the clover probably will not appear the following spring. The seeds germinate and young plants die.

Pasture fertilizer recommendations from the Mississippi Experiment Station of State College are as follows:

New pastures—First, sample the area to be put to pasture as directed by the County Agent and let him send the samples to the Soil Testing Laboratory. Lime to bring the pH of the soil to between 6.5 and 7. This will vary with soil type, topography, degree of erosion, etc.

Apply liberal amounts of some phosphatic material if soil tests low or medium in phosphate. Apply at least 100 pounds of available P_2O_5 to be followed by annual applications of 60 pounds of P_2O_5 per acre.

Soils testing low or medium in potash should get an application of 100 pounds of K_2O per acre. This equals 200 pounds of muriate of potash or its equivalent per acre.

The above amounts, if not supplied with materials, may be supplied by 1,000 pounds of basic slag plus 200 pounds of muriate or 800 pounds of an 0-14-7 per acre.

Top-dressing a newly seeded or sodded pasture after growth begins with 200 pounds of nitrate of soda or its equivalent is recommended.

Old or existing pastures—Top-dress sandy soils with 500 pounds of finely ground liming material and heavy soils with 1,000 pounds every five years.

Apply at least 60 pounds of available P_2O_5 per acre per year. Use 50 pounds of available K_2O per acre every other year. Under management, apply 16 to 32 pounds of nitrogen per acre in July.

Temporary pastures—Fertilize legume crops with 60 pounds of available P_2O_5 and 25 pounds of available K_2O per acre. Four hundred pounds of 0-14-7 may be substituted for above materials. Grass crops such as the small grains should receive 32 pounds of nitrogen per acre two weeks before grazing.

The lowering of the cost of production and the efficiency of production are as important in agriculture as in any other type of industry. In this economic sense, the efficient production of livestock and livestock products is directly related to the production of pastures.

Soil fertility is probably the most important factor to be considered in the selection of land for pasture. Like other crops, pasture plants can produce only in proportion to the productive capacity of the soils upon which they are grown. Land that is too poor

Here are some of W. C. Smith's 40 acres of fine White Dutch clover pasture.

to produce crops will cause disappointment if put to pasture without fertilization.

Should land that is to be put to pasture have slope enough to be subject to erosion, means should be provided for erosion control. When converting previously terraced fields to pasture, the terraces and the row system should be re-worked so that all rows are on a contour and the furrows are shallow enough to allow mowing. Erosion control also prevents the movement of seed and fertilizer by flowing water.

Potash has given profitable results on many soil types. Especially is this true where legumes have been grown for hay for many years. An application of 200 to 300 pounds of muriate of potash or its equivalent made just before disking is recommended.

In the establishment of newly seeded pastures, an application of nitrogen will hasten the establishment of the grasses. A top-dressing of 100 to 200 pounds of nitrate of soda or its equivalent after the grasses are up or starting growth will greatly hasten their establishment.

Potash: The Sugar Maker

(From page 26)

of 2-12-6 if these mixed fertilizers were used.

Our heavy virgin timbered soils contained up to 40,000 pounds of potash per acre at 6-inch depth. Of this only 300 to 600 pounds were available. The unavailable bulk of potash in the soil is like the cash in a bank to the man on the sidewalk. As long as he only had a dime in his pocket, the frozen reserve was hardly of much use or comfort to him. So it is in the soil; this available supply is today dangerously low in nearly all soils not heavily fertilized. The hunger signs of potash starvation are so common that every farmer

owes it to himself to learn to recognize them.

We marvel at the performance of such crops as alfalfa. It is common experience that the oftener alfalfa is grown on a field, the fewer seems to be the years that a stand will last. Just figure out how many tons of hay have been removed and calculate how much potash has been removed at the rate of about 45 pounds potash (K_2O) per ton of hay. Then add up how much potash has been returned in fertilizer and in manures (1 ton manure adds about 6 to 10 pounds potash) and you will not be surprised at one trouble causing the poor alfalfa yield.

Remember, the alfalfa root feeds out of the same taproot hole as long as the alfalfa lives and then think how this root and its smaller roots must have just about drained dry the soil next to these roots after 4 or 5 years of heavy production. Also, remember that crops may suck up too much potash if it is all added in large infrequent doses. Annual or semiannual applications have advantages over big ones 3 or 4 years apart.

Fortunately, potash presents no such serious reaction with the soil components that lock it up as does phosphate. So the problem of adding potash is simple as to manner of application. Just get it on, and be sure it is balanced with adequate phosphate, dolomitic limestone, some nitrogen and boron.

A Machine for Deep Fertilizer Placement

(*From page* 20)

up for the development of a machine which does not have these drawbacks. In short, a machine is needed which will place fertilizer at any depth from the surface of the soil to depth of plowing, and will have a hopper of handy height and of sufficient size to minimize the number of refills.

Fertilizer is the more effective the shorter the time between its application and need by the crop. This principle works against the farmer who likes to or must plow in the fall. Therefore there is also need for a machine which will place fertilizer deep in the spring on fall-plowed land.

It was decided rather reluctantly that qualifications as stated could be best obtained only in a machine which was an entity in itself. In the fall of 1944 the principal requirements of such a machine were suggested to the E. S. Gandrud Company, Owatonna, Minnesota, already manufacturer of a broadcast fertilizer spreader. It was hoped that Mr. Gandrud would have an experimental machine ready for trial in the spring of 1945, but labor and materials shortages delayed completion until well after planting season. The general features of the implement put together by Mr. Gandrud can be seen in the accompanying photograph. The hopper capacity is approximately 500 pounds and it is designed to place the fertilizer as deep as the land is plowed, but can be used for shallower placement. The shoes are spaced 15 inches apart and in the present model are not adjustable for various widths of spacing. It should be emphasized, however, that this machine is only in the experimental stage and it is planned to use it this coming season to determine its practicability, flexibility, and general all around usefulness and to determine what modifications are necessary.

One possible objection to this machine is that it represents another implement for the farmer to buy. Furthermore it is proposed that the implement be used on plowed land just prior to seeding and this involves another farm operation when time is at a premium. However, it is believed that in areas where the principles of deep and heavy fertilizer placement are practiced, the advantages of such a machine heavily override the disadvantages and at least promise to overcome some of the defects inherent in the attachment to the plow currently used for placing fertilizer deep.

Improved Production on Rubber Plantations

(*From page* 12)

change in soil structure. Tests showed a marked development of alkalinity in the soil which was, of course, caused by the alkaline residue from the long-repeated applications of sodium nitrate. This unfavorable development is an illustration of the trouble which can arise from the long-continued application of one type of fertilizer. Such difficulties can be avoided by alternating with another fertilizer involving a residue of the opposite reaction, in this case for example, by substituting ammonium sulphate occasionally in place of the sodium nitrate.

It is not impossible, of course, that somewhat similar difficulties will eventually arise in areas accorded long-continued applications of ammonium sulphate alone, due in this case to the development of excess acidity from the acid residue; so far, however, there have been no signs of trouble from this cause.

In addition to the two experiments discussed in this paper, many other manuring experiments have been conducted on the plantations of the United States Rubber Company in Sumatra and Malaya. As a general resume of the results obtained, it is of interest to mention the following:

1. Appreciable yield improvements attend the application of all types of nitrogenous fertilizers examined, regardless of the chemical form of the nitrogen.

2. The use of phosphatic manures by themselves does not result in increased production. Following treatment by a combination of nitrogen plus phosphate, the trees occasionally show greater improvement in appearance than that attending the use of nitrogen alone; the yields, however, are no better than those available from the use of the accompanying nitrogen by itself. Actually, there is some slight evidence to the effect that the application of phosphate tends to repress yields. If true, this can be taken to indicate that maximum rubber production does not necessarily attend optimum growth conditions for the tree.

3. As a general rule, the available potash in the plantation lands under discussion seems to be adequate; it has only been possible to demonstrate an advantage from potash manuring in certain very restricted areas in Malaya consisting, for the most part, of old sandy river beds.

Improved Planting Material

It is not the intention in the present paper to enter into a detailed discussion of genetical selection with rubber leading to the development of better planting stock. It is of interest to touch

Photograph showing the typical appearance of a nitrogen-starved stand of rubber. Note the pale, small-leafed and sparse foliage which permits an abundance of light to reach the ground. Here the soil is too poor to support a ground cover.

upon this subject in passing, however, since the work has resulted in even greater yield improvement than that attending the application of artificial fertilizers to stands of unselected rubber.

In the old unselected seedling stands, there exists very considerable yield variation among the individual trees; although the average production may amount to, say, five lbs. rubber per tree per year, there are always a few individuals yielding in the 20- to 40- lb. per-year range and, very infrequently, trees giving even more than this. As an initial step in the problem of selection, production measurements were taken on all the 4,000,000 trees situated in the 40,000-acre complex of old "H.A.P.M." and the individuals grouped in yield classes. The trees in the higher yielding groups were then used as sources of budwood for the production of vegetative offspring. These vegetative offspring consist of buddings made on seedling stocks; all buddings originating from a single seedling mother tree are said to comprise a clone. In the case of some seedling mother trees, the high-yielding characteristics are to be found in the vegetative offspring while in other cases this does not occur; accordingly, it is necessary to "prove" a clone before it can be adopted for general use. Clone-proving consists in planting out an adequate number of the buddings for testing purposes and, after they have attained maturity, keeping them under yield observation until the production characteristics are definitely determined.

In this way, some very desirable clonal planting material has been developed. It is true that this process of selection is comparatively slow since it is necessary to wait about five years after planting before a budding may be tapped and tapping must be continued for some considerable time (preferably seven years although shorter intervals are frequently used) before yield characteristics are adequately established.

The average yield of the buddings comprising a clone is never as high as the production rate of the corresponding seedling mother tree; nevertheless, the harvest from areas of proved clones shows very decided improvements over

the crop available from unselected seedlings.

The first proved clones which became available for use as planting material yielded in the range of 10 to 12 lbs. per tree per year; a subsequent group of clones was developed with production capacity in the range of 15 to 20 lbs. per tree per year; during the period just preceding the war, still further improved material became available with indicated yields in the range of 25 to 30 lbs. per tree per year.

During the last 15 years preceding the war in the Pacific, all extensions on the plantations of the United States Rubber Company, in both Sumatra and Malaya, were made with the best available planting material of the type just described; the same applies to areas which have been cleared of old rubber and replanted. The earlier of these improved plantings were already in production before the war and the yields obtained were about in line with expectations as derived from the clone-testing experiments. The highest yield of rubber so far obtained from a large area in routine commercial production was realized in one of these extensions when the harvest amounted to just over 1,800 lbs. per acre in a single year; at the time in question, the trees had not yet attained full maturity nor maximum production rates. There is every indication that the more recent stands of further improved planting material will yield at maturity in the range of 2,500 lbs. per acre per year or higher.

Concluding Remarks

The adoption of an adequate manuring program for the plantations of the United States Rubber Company has provided a quick means for the realization of improvements in crop to quite satisfactory yield levels in the old original plantings.

More gradual but greater improvement in yield levels has resulted from the development of better planting material through processes of genetical selection.

These two means of attaining increased production are, of course, complementary; actually, the yields mentioned above for the various classes of improved planting material relate to stands receiving adequate manuring treatment.

Accordingly, the combination of manuring treatment together with the use of the improved planting material, already developed, has provided the means of attaining production rates of about ten times those available from the old original plantings at the time when work was started on these problems.

Land Lore

(*From page* 5)

try the "idle ideology." Ergo, we need more speakers who will omit the prejudice pleas and talk unity for prosperity.

COMING back to the ageless topic of the family-operated farm, the theme and goal of speakers galore have ever been to preach ownership as opposed to tenancy. Since the days of Thomas Jefferson and onward through the western migration, the Ultima Thule of agricultural endeavor has been to get a deed to ancestral acres. Meanwhile many successful men have farmed well under tenancy and townsmen have rented stores and made good money. Yet we have always heard it said by vehement orators that the best plan was to mount the ladder, step by step, from hired hand to renter and thence to ownership. Without

doubt we have preserved the family farm ideal pretty well, but owner-operatorship is still a distant goal and landlordism dominates the picture.

It is probably true that landlords would provide much better housing and farm facilities and grant easier terms for tenants if there were fewer families bidding for the land in question. It sums up to the same old thing—that there are too many people crowding on too little land, which commands a sale and rental value regardless of the actual productivity of the unit or its ability to afford a fair American living standard under fair to middling operation systems.

Then there are countless philosophers in the renter class who avow with conviction and experience that they can do better for themselves by renting than if they put their savings or borrowed capital into a deed. To some extent they are living in the more fertile sections and are themselves helping to make the local community all that is most desirable. Such operators would rather put their cash into modern machinery and registered livestock or family welfare conveniences than to pinch along on the last upper rung of the w. k. ladder of tenure.

ANOTHER ill arising from the lack of good and in relation to demand for it shows up in the countless number of families who are obliged to work holdings much too small to support rural employment on a satisfactory basis. This new census seems to show a slight trend toward larger farms in many states, outwardly a strange thing because during the war years the bulk of the operators were middle-aged or older. Maybe this presages a noteworthy shift toward much larger operating units, something that is hastened by the age of power farming. If so, there must be a definite increase soon in the non-farm population, which in turn will thrust off their holdings numerous squatters who run small subsistence acres in suburban zones. What do we want after all — a chance for everybody who was raised on a farm to remain there if he desires, or larger and more economic working units manned by fewer operators? If farming is to copy the pattern set by corporate business enterprise, then farming as a way of life and living must yield to farming as a commercial success. This alternative is upon us and platitudes won't solve the question.

ADVANCE planning in the wake of forward thinking by farm leaders and economists is all the rage. Projecting past production ahead to the year 1950 and beyond and estimating what levels of output should be aimed for usually swing back to the old question of price and fair exchange value between farms and consumers of food.

It is axiomatic in all these schemes that farmers under modern methods and encouraged by recent successes will hardly go backward to a lower rate of voluntary production or be content with subnormal living standards. But recent relentless events in the non-farm sphere almost make me think that future planning for agriculture alone is not safe or sane. Just when the boys had returned and rolled up their sleeves to follow the plow and feed the shoats, we found out that city folks were rebellious and greedy for special privileges in one way or another, which upset both the apple cart and the hopes for reconversion. Most of our advance planners overlooked strikes and stalling methods by consumers when they figured out the balance sheets. Yet no farmer is safe to operate from day to day, because his whole investment is wrapped up in perishable things, and seeding time and livestock management call for some reasonable degree of certainty and confidence for at least a year or more ahead.

Until we set up some common ground for all economic groups to meet upon and pool their plans and set their goals, we are merely groping

and gambling in blocs and sectors with the country's welfare and mutual good will at stake. If labor and farmers represent big business along with the capitalists and managers of commerce, why do they all seek separate destinies by divergent paths? All the platitudes and preachments galore won't guess us out of a dilemma created by one-track minds, whose chief interest in the other guy is what his wages will buy of the stuff they have to sell.

BEFORE we hope hard along these theoretical lines, of course, we have to clean our own house of obstacles. By this I refer to the diversity of opinion within the ranks of agriculture and within the processing and farm-serving systems as to the right course to take, if any.

We discuss parity prices and income, price supports, producer subsidies, two-price systems, food allotments, social security, plenty of control or none whatever. We put a man in as avowed leader and pace-maker and give him the good old American "razzberry" at the first slip. Only tough old owls of hard-boiled mien and indifference to opinion can last through such a barrage. Then when they get too tough and indifferent they are also valueless and dictatorial. We ask for free speech and determined personal courage, but we want to use the free language and ask the other fellow to produce the courage to stand for it.

Those entrusted with the burden of agricultural decisions and expected to guide us Moses-like into the promised land face a tremendous task and a set of highly complex and inter-related problems for solution. And the joker in the deck is that after such leaders have made such ponderous decisions for agriculture, it's up to the lone old farm operator to make his own decision after all, as much as he can under current cramping circumstances.

History shows us that positive all-out production programs have been easier to realize and quicker to bear fruit than the kind which come in the opposite direction during depressed consumer situations. The magnificent response of farmers to the need for food and fiber in war-time was possible because of the inner urge which all farmers have to outdo themselves. But two factors were also responsible aside from machinery — favorable weather on the whole for six years straight and the fact that many farmers took increased production right out of their own hides.

Price terms that were attractive may have influenced farm families to nobler efforts under handicaps, but prices surely had nothing to do with weather behavior. Neither did prices directly influence yields per acre derived from the wider use of pedigree seed and hybrid corn or tested dairy cows or better bred hogs. Those things, as well as soil improvement discoveries, occurred as much during the depression as afterwards, although the presence of such means and methods at a crisis enabled the production to reach unheard-of heights.

IN all future calculations on production we can omit the price factor as far as certain basic scientific contributions to agriculture and animal husbandry are concerned. These improvements and new discoveries will proceed just as sure as night and day, and they will happen to us whether farm prices lag or boom. Does this mean that average farm prices must in the long run advance to justify efficiency, or does it signify that competing farmers will use these new discoveries to enable food prices to stay at a medium level for mass consumption?

Finally we come to the sixty-four dollar question relating to a boom or bust in land values. An unhampered, full-fledged upsurge in farm values is the surest road to ruin known to modern agriculture. In a way it is like the weather, because there are many discussing it but very few who are able to stop it.

Given the same stimulating forces which produce an era of crazy land price-kiting as we had after the other world war, then the only variable (?) factor in the whole equation is human behavior. But maybe we better not bank too much on human reactions to these same conditions, even though so many warnings and bulletins have been released to stem the tide of title-taking. The young men especially must learn things all over for themselves, even if it costs them money and comfort.

Supporting the notion that land values should go higher is the prime reason felt by many speculators that farm demand and prices will keep on a firm level for two or three years more. The recent famine jitters have also operated to make investment in land attractive and interesting to thousands who never had such an urge before. The slim margin which exists between a feast and a famine has been publicized widely and I have heard many a city slicker yearn for a small plot on which to grow his own beans and nourish his own cow. All this adds up to a land boom, or I am off the trolley.

What's more, we have high net rental values to count on in relation to land values. Landlords have secured much above normal returns in recent years. More farm boys are returning and, giving one sick look at the city muddle, are flying back to the home roost or one like it.

SO we can prepare for more heated oratory on all farm fronts, giving us again the chance to clap or condemn as the subject warrants. After all, it would be a very tiresome world were there no farm problem to solve or no wrongs to be righted. I almost wish, however, that the campaigners would refrain from hectic debate until after the fairs and the dog days—at which time I will have cooled off enough to listen with my usual erudition.

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During a weekly Press Conference with the local Congressman, one of the society reporters asked him:

"Tell me, Senator, do you believe that tight clothes stop circulation?"

"Not with a woman, my dear," replied the Congressman. "The tighter the clothes, the more she's in circulation."

"Pa, my teacher told me that I was illiterate," announced the teen-age Arkansawer.

"The heck he did!" snorted the irate parent. "Well, you just take your birth certificate to school with you tomorrow and show him you ain't."

Some women's slacks look all right at the cuff, but they look kind of funny around the bottom.

"When we want to visit the restricted hot spot areas," a soldier wrote from North Africa, "we dress up like the native women—with veils over our faces. Because they don't dare peek, even if they suspect the truth, the MP's are going nuts!"

A man called a Doctor on the 'phone and said his wife had had a severe attack of appendicitis and he wanted her operated on:

Doctor—"You are mistaken. How could your wife have appendicitis, when I removed her appendix three years ago?"

Man—"Easy enough, I have another wife."

DRAMA.

He had choked her. She was dead; there was no doubt about it. He had listened to her dying gasp. Now she was cold—cold as the hand of death. Yet in his anger he was not convinced. Furiously he kicked her. To his amazement she gasped, sputtered and then began to hum softly.

"Just a little patience is all it takes, John," remarked his wife from the back seat.

Golfer—"Terrible links, caddy, terrible links!"

Caddy—"Beg pardon, sir, but this ain't the links. For the last half hour we've been on the south 40 of Cloverdale Farm."

A Negro pastor in an impoverished area sent frequent appeals to his bishop for aid. Tired of the constant requests, the bishop wrote to the pastor telling him to send no more appeals for aid. In a few weeks the bishop received this note:

"This is no appeal. It is a report. I have no pants!"

An elevator operator, off for the day, was replaced by a girl who on her first trip brought the elevator to an abrupt stop.

"Did I stop too quick?" she asked the passengers.

"Oh, no indeed," coyly replied a little old lady in one corner of the car. "I always wear my bloomers around my ankles."

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● In furtherance of our policy.—Serving Through Science—we developed and offered the agricultural world a new seed protectant, SPERGON, several years ago. In SPERGON we sought to provide the most effective, dependable and lasting protection for seed against soil-borne and other fungus diseases, along with complete safety for the user. Gratified at the remarkable reception and recognition given to SPERGON, our agricultural scientists have developed a new group of materials to aid the farmer in protecting his crop against loss or damage from plant diseases, insects, and weeds.

Joining SPERGON as important agricultural aids are:

PHYGON*—A Dichloro-Naphthoquinone compound of remarkable fungicidal value. Using as little as ½ lb. per hundred gallons of water gives a very effective spray for control of scab and blight diseases for fruit, flowers and vegetables. After application to the plant, PHYGON becomes water-insoluble—stays on through rains. PHYGON is also valuable used in powder form for treating seed of spinach, beets, and Swiss chard. ***Formerly known as "U. S. 604"***

SYNDEET—An improved DDT agricultural spray, in which a special synthetic oil, developed by our research, extends the killing power and range of DDT. Insects, such as aphids and mites, not removed by DDT alone, are destroyed by SYNDEET.

TUFOR—Selective weed killer that is non-fuming. An improved formulation of the chemical herbicide that destroys broad-leaved plants only, TUFOR is freely soluble in water and easier to handle with spray or sprinkling equipment. Its low volatility eliminates fumes that stray and damage other plants in the vicinity... keeps the full strength where applied. Supplied in concentrated form for convenience in handling, TUFOR is quickly made up to standard-strength by adding water when ready to apply.

SYNTONE—Rotenone emulsion spray of full strength and reliable effectiveness against specific pests.

Inquiries on these materials are invited. Write to:

UNITED STATES RUBBER COMPANY

Naugatuck Chemical Division

1230 AVENUE OF THE AMERICAS, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

THE PLANT SPEAKS

A new four-reel series of 16 mm., sound, color films which may be booked independently or in any combination. They may be used to best advantage when shown at least one day apart and in the following sequence:

THE PLANT SPEAKS THRU DEFICIENCY SYMPTOMS pictures soil depletion, erosion, and deficiency symptoms on plants. (Running time 25 min. on 800-ft. reel.)

THE PLANT SPEAKS, SOIL TESTS TELL US WHY depicts taking soil samples on the farm and the interpretation of soil tests. (Running time 10 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU TISSUE TESTS shows the value of tissue testing and the procedure for testing plant tissues in the field. (Running time 14 min. on 400-ft. reel.)

THE PLANT SPEAKS THRU LEAF ANALYSIS evaluates leaves in plant growth and leaf analysis in determining fertilizer needs. (Running time 18 min. on 800-ft. reel.)

We shall be pleased to loan these films to agricultural colleges, experiment stations, county agents, vocational teachers, responsible farm organizations, and members of the fertilizer trade.

OTHER 16MM. COLOR FILMS AVAILABLE FOR TERRITORIES INDICATED

Potash in Southern Agriculture (South)
In the Clover (Northeast)
Bringing Citrus Quality to Market (West)
Machine Placement of Fertilizer (West)
Ladino Clover Pastures (West)
Potash from Soil to Plant (West)
Potash Deficiency in Grapes and Prunes (West)
New Soils from Old (Midwest)
Potash Production in America (All)
Save That Soil (All)

IMPORTANT

Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of time of loan.

American Potash Institute
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